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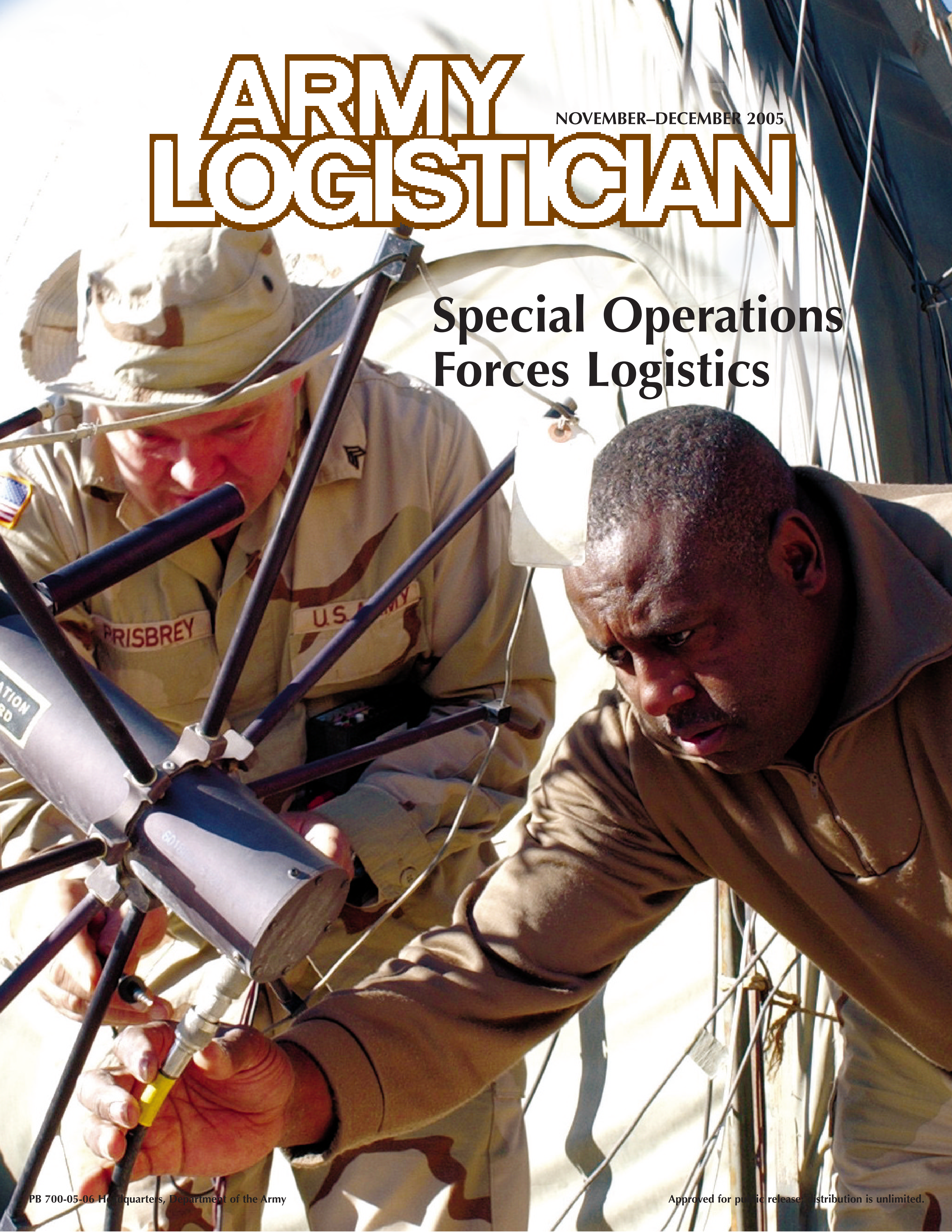

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Cover: A new support structure for Army Special Operations Forces (ARSOF), designed to better meet ARSOF-unique requirements, is replacing the 528th Special Operations Support Battalion. However, as the article beginning on page 28 demonstrates, the experiences and practices of the 528th continue to offer many lessons for ARSOF logisticians. In the cover photo, two noncommissioned officers at the Combined Joint Special Operations Task Force electronic maintenance shop at Bagram Airfield, Afghanistan, check the connection on an ultra-high-frequency satellite communication antenna during the early days of Operation Enduring Freedom.

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ALOG NEWS

BRAC COMMISSION DECISIONS AFFECT ARMY LOGISTICS

The Base Realignment and Closure (BRAC) Commission has voted to keep open Red River Army Depot, Texas, and Hawthorne Army Depot, Nevada, rejecting Department of Defense (DOD) recommendations to close them. The commission also voted against a DOD proposal to move the Army Aviation Logistics School from Fort Eustis, Virginia, to Fort Rucker, Alabama, to join the Army Aviation Center and School.

The BRAC Commission supported the great majority of DOD recommendations for the Army. In the most significant change for Army logistics, the Army Transportation School (now at Fort Eustis, Virginia) and the Army Ordnance School (now at Aberdeen Proving Ground Maryland, and Redstone Arsenal, Alabama) will move to Fort Lee, Virginia. There, they will join the Army Combined Arms Support Command, the Army Quartermaster School, and the Army Logistics Management College to form a Logistics Center of Excellence. The commission endorsed creating a Joint Center of Excellence for Culinary Training and a Joint Center for Consolidated Transportation Management Training at Fort Lee, bringing together all DOD training in those areas.

Other DOD recommendations approved by the commission will relocate major components of the Army Materiel Command (AMC). AMC headquarters and the Security Assistance Command will move from Fort Belvoir, Virginia, to Redstone Arsenal, and the Communications-Electronics Command will relocate from Fort Monmouth, New Jersey (which is closing), to Aberdeen Proving Ground. The Military Surface Deployment and Distribution Command will move from Fort Eustis to collocate with the U.S. Transportation Command and the Air Force's Air Mobility Command at Scott Air Force Base, Illinois.

In addition to Fort Monmouth, other Army installations approved for closure are Newport Chemical Depot, Indiana; Deseret Chemical Depot, Utah; Umatilla Chemical Depot, Oregon; Mississippi Army Ammunition Plant, Mississippi; Kansas Army Ammunition Plant, Kansas; Lone Star Army Ammunition Plant, Texas; Riverbank Army Ammunition Plant, California; Fort Monroe, Virginia; Fort McPherson, Georgia; Fort Gillem, Georgia; and Walter Reed Army Medical Center, D.C.

The President has approved the actions of the BRAC Commission. The list of closures and realignments will become final unless Congress passes a joint resolution of disapproval.

DUNWOODY NAMED ARMY G–4

Major General Ann E. Dunwoody, the Commanding General of the Army Combined Arms Support Command (CASCOM) and Fort Lee, Virginia, has been nominated for promotion to lieutenant general and appointment as Deputy Chief of Staff, G–4, U.S. Army. General Dunwoody will be the first woman appointed as the Army G–4. She will succeed Lieutenant General C.V. Christianson, who has been named as Director for Logistics, J–4, The Joint Staff.

Before her assignment as Commanding General of CASCOM, General Dunwoody commanded the Military Surface Deployment and Distribution Command in Alexandria, Virginia, from October 2002 to August 2004.

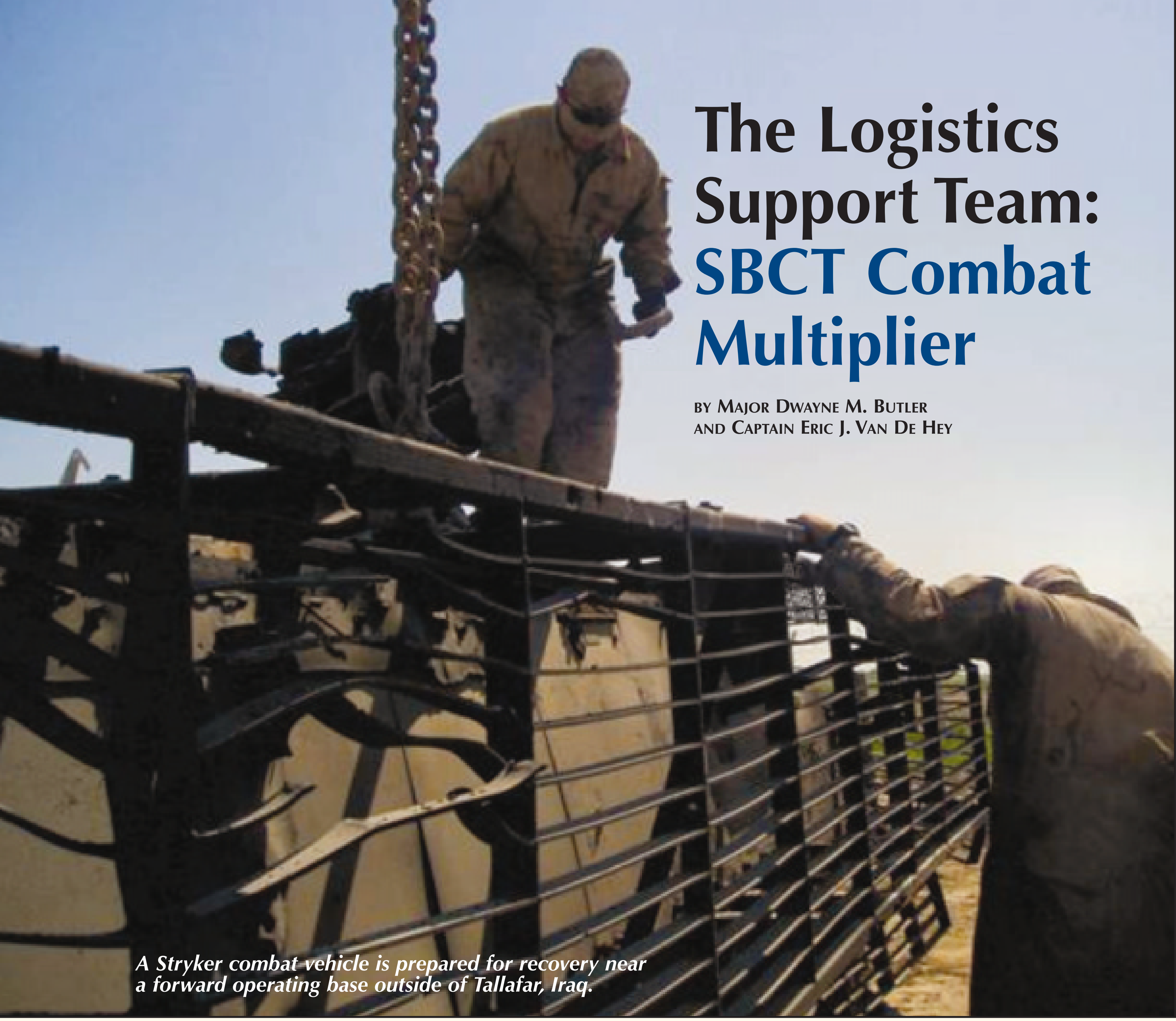
General Dunwoody has a bachelor's degree in physical education from the State University of New York at Cortland, a master's degree in logistics management from the Florida Institute of Technology, and a master's degree in national resource strategy from the Industrial College of the Armed Forces. She is a graduate of the Quartermaster Officer Basic and Advanced Courses and Basic Airborne School.

STATIONING DECISIONS ANNOUNCED

The Army announced in July the planned locations for its active component modular brigade combat teams (BCTs). The stationing of the BCTs is part of the Army's transformation into a campaign-quality force with joint and expeditionary capabilities. The stationings also are critical to ensuring that the Army is postured to maintain the high degree of readiness needed to meet its strategic commitments, including ongoing operations in the Global War on Terrorism.

The Army selected the BCT locations based on their existing and potential capacities, available training space, and the current locations of similar and supporting units. The design also preserves the Army's historic heraldry and lineage. Although the

(ALOG NEWS *continued on page 55)*



A Stryker combat vehicle is prepared for recovery near a forward operating base outside of Tallafar, Iraq.

The Logistics Support Team: SBCT Combat Multiplier

BY MAJOR DWAYNE M. BUTLER
AND CAPTAIN ERIC J. VAN DE HEY

The Soldiers of the 25th Infantry Division's Brigade Support Battalion developed a way to maintain command and control of 1–25 Stryker Brigade Combat Team assets on the battlefield.

During the development of the Stryker Brigade Combat Team (SBCT) concept, the logistics community decided to streamline the SBCT's overall logistics footprint, practices, and procedures to mirror the overall transformation of the Army. To foster the agile, adaptive mindset needed in the SBCT, the Army logistics community promoted continuous adaptation and creative tailoring of the SBCT's concept of support.

The most significant streamlining of logistics systems in the SBCT occurred in the centralization of all support assets under the organic command and control of the brigade support battalion (BSB). For example, there are no support platoons in the maneuver units of the SBCT. The organizational mechanics and food service specialists usually found in the support platoons are now organic assets of the BSB. The concept

set forth in the Stryker Brigade Combat Team Organizational and Operational (O&O) Planning Document places food service specialists and mechanics in standard configurations called field feeding teams and combat repair teams, respectively, which have habitual relationships with counterpart maneuver units.

The SBCT logistics systems were streamlined further when the organizational and direct support (DS) levels of maintenance were combined into one level called field maintenance. The tailorable aspect of SBCT logistics is achieved by forward-deploying additional support capabilities to accomplish the mission.

Development of the LST

When the 1st Brigade, 25th Infantry Division (Light), Stryker Brigade Combat Team (1–25 SBCT), at Fort Lewis, Washington, deployed to Iraq in September 2004, it was organized under a mission-tailored, forward-deployed logistics support team (LST) concept. An accompanying command and control (C2) cell managed logistics on the battlefield.

The LST concept had been conceived in July 2003 when Soldiers of the 25th BSB realized that a C2 void would exist when the battalion's logistics assets were forward-deployed in support of its brigade's maneuver units. With a rotation to the National Training Center (NTC) at Fort Irwin, California, looming in October 2003, C2 of the brigade's logistics assets, or the lack thereof, was a critical concern. The 25th BSB support operations (SPO) planning cell reviewed after-action reports from the first SBCT's previous certification exercises and developed a C2 plan to help manage the field feeding teams, combat repair teams, and any other logistics assets deemed necessary as a result of the logistics estimation process.

The LST concept, supported by a decision briefing, was presented to the 25th BSB commander on 25 July 2003. The decision briefing focused on the merits of establishing C2 elements for the BSB assets that were forward-deployed with the supported units. The briefing helped to identify the C2 requirements and the logistics assets the LST needed. Leadership was, of course, an essential component of the battlefield operating system, so standing operating procedures or specific tactics, techniques, and procedures would be needed to augment the doctrinal guidance provided in the SBCT O&O concept.

Initially, it was thought that the warrant officer on the combat repair team might be able to provide C2 for the LST. However, it was determined that, although the warrant officer could manage the LST, the additional administrative support requirements of battalion planning and interface with the SPO could distract from his mission as the forward maintenance manager for the supported unit. Because the combat repair teams had only 20 mechanics, the warrant officer also was heavily involved in the team's daily operations.

Analysis determined that the best candidate for the C2 position on the LST would be a lieutenant from a BSB unit. A lieutenant was chosen because he would bring an adequate level of experience to the C2 role and interact with the supported unit. The battalion also could better absorb the loss of a lieutenant than the loss of one of its few assigned captains. The 25th BSB commander approved the dispatch of a lieutenant and a noncommissioned officer in charge (NCOIC) with each task-organized support slice, and the LST concept was born.

In essence, the LST commander would serve three primary functions. He would provide C2 of all BSB assets, personnel, and equipment; conduct liaison with the supported battalion commander in order to plan and execute logistics; and serve as the SPO's eyes forward. Some of the supported battalions chose to collocate their combat train command posts with their field train command posts, which in essence collocated the battalion's internal logistics points with the BSB. In those instances, the LST commander still was deployed to serve primarily as a liaison officer.

This 1–25 SBCT load-handling system was tailored to deliver polling site materials during the Iraqi elections in January 2005.

A combat recovery team member operates the hydraulic lifts on a crane on the forward repair station at a forward operating base near Tallafar, Iraq (above). A combat recovery team Soldier enters maintenance faults into his electronic technical manual interface computer at a forward operating base in Mosul, Iraq (below).

Since there is an inevitable cost associated with taking a lieutenant from a full-time position in the BSB, the LST commander position exists only under the task-organized conditions of major deployments and operations. The BSB experimented with having the BSB permanently task-organized to account for the LST commander position, but that option was determined to be unnecessary. Besides, managing the LST while deployed would give the selected lieutenant a chance to train the Soldiers of his parent companies.

Implementation of the LST Conept

Before forming the LST, the 25th BSB provided the supported battalion with a field feeding team and a combat repair team. The LST concept simply merged—under the C2 of a lieutenant and an NCOIC—these two elements and other required support assets, such as transportation and materials-handling equipment with operators and medical evacuation platforms.

A typical LST consists of—

• One lieutenant.

• One combat repair team of 20 personnel, including a warrant officer (CW2) and 5 embedded contractors, with an M977 heavy, expanded-mobility, tactical truck (HEMTT) load-handling system (LHS), 2 forward repair systems, and 2 M984 HEMTT wreckers.

• One field feeding team of 10 personnel with 1 containerized kitchen and 1 refrigerated van.

• One distribution section of 10 personnel with 3 LHSs, 2 Atlas forklifts, and 1 M978 HEMTT tanker.

For rotations to the NTC and the Joint Readiness Training Center (JRTC) at Fort Polk, Louisiana, and

deployment to support Operation Iraqi Freedom, the task organization of the LST is tailored to accommodate the supported unit's missions. In addition to the habitual field feeding team and combat repair team, the LST's assets include LHSs with trailers, fuel trucks, medical personnel, Department of the Army logistics assistance representatives, and civilian Stryker mechanics.

LST Advantages

A major benefit of the LST concept is its flexibility. By forward-deploying distribution company transportation and fueling assets with maneuver battalions, the LST commander can move the forward-deployed BSB assets to the brigade support area (BSA) to pick up and deliver DS stocks. Force protection is provided by the maneuver unit.

Some people might say that having customers pick up their own DS stocks violates the provisions of the O&O concept, but they would be mistaken. A BSB C2 element uses the BSB's DS assets to travel back to the BSA and conduct resupply missions. Having assets forward with the LST commander enables the forward support elements to react to the needs of their supported battalion instead of waiting for the BSB (-) to react, which reduces the need for emergency LOGPACs (logistics packages). The LST commander maneuvers this combat logistics patrol with force protection provided by the supported unit, usually in the form of Stryker escorts.

The LST has sometimes been referred to as a replacement for the support platoons, which the SBCT O&O concept removes from the maneuver battalions. Actually, the LST functions as both a support platoon and a forward logistics element. With the removal of the support platoon, the maneuver unit no longer has unit-level maintenance, food service, or support capabilities. All of this capability now resides in the BSB, thereby centralizing the C2 of all logistics in the brigade's area of operations.

The O&O concept prescribes a mixture of other full-time logistics management jobs in the maneuver battalion, with the principal job being that of the support unit battalion S–4. In most maneuver battalions, the battalion S–4 is sometimes a pre-advanced course captain or lieutenant who has been given the full responsibilities of a primary staff officer. This busy officer also is expected to provide C2 for approximately 50 to 60 BSB logisticians of various military occupational specialties while running a battalion distribution point, monitoring DS logistics status reports, and performing many other related duties. The LST commander serves as a logistics expert in the supported battalion's area of operations and also helps manage BSB resources and missions.

One of the greatest strengths of the LST concept is its "plug-and-play" nature. The LST is designed to be a mission-tailored package that can augment units and deliver robust area support, such as when a 1–25 SBCT LST provided mechanics for the Directorate of Logistics at the NTC, or mission specific, such as when it provided mobile gun support for the 1st Battalion, 24th Infantry Division (Mechanized), at the JRTC.

For increased C2, the lieutenant on the LST can be replaced with a captain, as was the case during the 1–25's rotation to the NTC and Operation Iraqi Freedom III. In Iraq, the 1st Battalion, 5th Infantry Regiment (Mechanized), was task-organized under the 1st Cavalry Division in a totally different area of operations more than 300 miles from the 1–25.

The LST concept was fully employed during the 1–25's rotation to the JRTC in the spring of 2004, and it received praise from the observer-controllers. During that rotation, the LSTs were task-organized to the specific mission of the supported units. Other factors that determined LST task organization were the proximity of the supported forward operating base to the BSA and the number of additional units operating within the maneuver unit's battlespace (area support). Logistics support of the brigade during that JRTC rotation was a success, largely because of the LST concept. The concept worked so well on the JRTC battlefields that some participants questioned the "toughness" of the exercises, not realizing that it was the LST's agility and adaptability that made the exercises go smoothly.

Another advantage of having the LST embedded with the maneuver units is that its "reach back" capability enables it to conduct reverse LOGPACs. Maneuver units can program interim resupply missions to match their operating tempos. Force protection provided by the supported units allows the BSB to concentrate its own limited force-protection platforms on scheduled LOGPACs from the BSA to outlying forward operating bases. For example, in Iraq, one of the supported units is located at least an hour's drive from the BSA. It receives regularly scheduled LOGPACs every 3 or 4 days. With embedded LST assets and force protection provided by the maneuver unit, the supported unit also can receive interim logistics support. This is especially important when dealing with critical repair parts because the BSB's distribution capabilities limit resupply to one push every 48 hours on average.

The LST concept has been the backbone of the 1–25 SBCT logistics effort during the brigade task force's deployment to Operation Iraqi Freedom. As at the NTC and JRTC, the LST commander is the liaison between the supported unit and the SPO. The LST commander also assisted with a variety of logistics

Combat repair team Soldiers replace damaged parts on a Stryker combat vehicle.

planning functions, such as helping the supported unit S–4s synchronize their logistics plans with the BSB; establishing the C2 node and managing the supported task force's DS stocks and personnel within the LST; planning and executing recovery operations; and, as a logistics mission commander, ensuring that logistics resupply convoys were coordinated and that they reached remote operating bases.

Employment Considerations

Although the LST concept has proven to be an invaluable tool in supporting the 1–25 SBCT, it does come with some warning labels. First, the LST commander should not be expected to perform as the S–4 or assistant S–4 of the supported unit and should not be used as a replacement for a weak battalion S–4. The LST commander serves as a vital link between the supported unit S–4 and the BSB's DS element.

Second, collocating the LST commander with the supported unit is critical to maintaining C2 of the LST's assets. Although the LST commander assists the supported unit S–4 in planning logistics support for the unit's maneuver operations, locating him near the supported unit's combat train command post or field train command post is paramount to the LST's success. As the eyes forward for the SPO, the LST commander can enhance the situational awareness of the SPO element and help orchestrate logistics support for the entire brigade.

The LST concept is a combat multiplier that should be considered when planning logistics support operations. The LST is not a replacement for the support platoons of old; rather, it should be thought of as a DS logistics element that is embedded in the supported unit. It is a C2-centric concept that places leadership forward in the battlespace to better manage the assets of the BSB and interface with the support unit. The LST concept is founded in, and supported by, clear and concise logistics, which affords both the supported unit and the LST commander the flexibility to conduct operations and planning in any battlespace. Since the 1–25 SBCT's deployment to northern Iraq in support of Operation Iraqi Freedom, the LST concept has proven to be invaluable in providing forecasted and responsive logistics support to the brigade's assets in the area of operations as well as to coalition forces and civilian contractors on the battlefield. **ALOG**

Major Dwayne M. Butler is the speech writer for the Chief of Staff of the Army at the Pentagon in Washington, D.C. When this article was written, he was the Executive Officer of the 25th Brigade Support Battalion, 1st Brigade (SBCT), 25th Infantry Division (Light), at Fort Lewis, Washington. He was the principal designer of the logistics support team concept. He has bachelor's degrees in Spanish and economics from Rutgers University in New Jersey, a master's degree in administration from Central Michigan University, a doctorate of philosophy in organization and management from Capella University in Minnesota, and a doctorate in education from Rutgers University. He is a graduate of the Combined Logistics Officers Advanced Course and the Army Command and General Staff College.

Captain Eric J. Van De Hey is the commander of B Company (Forward Maintenance), 25th Brigade Support Battalion, 1st Brigade (SBCT), 25th Infantry Division (Light), at Fort Lewis, Washington. He served previously as the Deputy Support Operations Officer and Support Operations Plans Officer, during which time he was the lead planner and co-creator of the logistics support team concept. He has a bachelor's degree in psychology and business from the University of Wisconsin at Green Bay.

The authors wish to thank Lieutenant Colonel Cheri A. Provancha and Major Michele M. McCassey for their assistance with the preparation of this article. Lieutenant Colonel Provancha is the commander of the 25th Brigade Support Battalion, 1st Brigade (SBCT), 25th Infantry Division (Light), and Major McCassey is currently deployed to Mosul, Iraq, where she is overseeing the implementation of the logistics support team concept.

The Challenge of Victory

BY CAPTAIN JERRY D. VANVACTOR

A training program for 30th Medical Brigade Soldiers certifies them in squad-level tactics they hope they will never have to use on the battlefield.

The sun is shining, and an early morning rainfall has cooled the air just enough to make the heat tolerable. Quietly, a squad of Soldiers moves along a well-worn dirt road toward an unnamed objective. The Soldier walking point continuously scans for anything suspicious that could warrant investigation. The other Soldiers quietly scan their sectors for anything out of the ordinary as they make their way down the road.

A single shot shatters the morning calm. Moving in synch like the gears of a finely tuned machine, the Soldiers fall to the ground and take cover behind anything they can find. They watch for movement in the direction of the gunfire. One Soldier yells out the word that no one wants to hear—"Sniper!"

Immediately, the squad leader calls his radio telephone operator forward so that he can transmit a situation report advising his higher command of contact with an unknown enemy element. In the middle of the transmission, he yells, "Find that guy and tell me where he is!" Another shot rings out and a Soldier yells, "One o'clock!"

The squad leader immediately assesses the risk and begins directing action. "Alpha Team, lay a suppressive base of fire in that direction, and Bravo Team, bound forward!"

This scenario could have occurred anywhere. Fortunately, it was not real; it was part of a training event called "Victory Challenge." The Soldiers involved were assigned to the 30th Medical Brigade in Heidelberg, Germany. They held a mix of military occupational specialties, and their ranks ranged from private to colonel.

Victory Challenge resulted from a V Corps order mandating that all "V Corps units deploying in support of the Global War on Terrorism must be trained to conduct engagements with enemy forces in the situations Soldiers are likely to encounter in a 360-degree battlefield." V Corps leaders wanted combat support (CS) and combat service support (CSS) small-unit leaders to become proficient in attacking and defending through participation in dismounted situational training exercises, convoy gunnery procedures, and small-arms firing.

Victory Challenge is built around a list of assigned tasks that must be rehearsed until the participants can demonstrate proficiency in them. It is important to note that this training is not merely a predeployment

All tasks are taught before they are rehearsed.

Phase 2 trainees demonstrate close-quarters marksmanship skills. Role players create a civil disturbance (inset).

requirement. The V Corps order requires all CS and CSS units to train every 2 years and meet qualification standards set forth in tables of standardization published by V Corps. The training focuses on squad-level tactics employed in a variety of situations that units face in areas of operations.

The purpose of Victory Challenge is to instill the warrior ethos in small-unit leaders. In his book, *Operation Excellence: Succeeding in Business and Life—The U.S. Military Way*, Lieutenant Colonel Mark Bender, U.S. Army (Retired), states, "War is the ultimate imperfection. The best one can hope for is to limit the damage, to keep the screw-ups to a sane level, and to survive to lick the wounds of victory. There can be glory, certainly, but it is always outweighed by the cost of its purchase."

An objective of training should be to ensure that Soldiers are equipped to make prudent decisions that will instill confidence in younger Soldiers. Realistic training scenarios build confidence in CSS Soldiers by inculcating in them a rational ability to make timely and effective decisions regardless of rank and title.

Certified Soldiers

In October 2004, the 30th Medical Brigade began setting the stage for Victory Challenge. In his fiscal year training guidance, the brigade commander established his intent, which, simply stated, was to "certify all deploying Soldiers on Victory Challenge tasks in a realistic and safe environment." He wanted all brigade Soldiers to become fully trained and certified in all of the combat arms-related tasks.

V Corps published the requirements of Victory Challenge training in a four-phased concept of operations—

- Phase 1: Individual observer-trainer training (train-the-trainer instruction in all tasks related to Victory Challenge).

• Phase 2: Individual small arms master marksman instruction; close-quarters marksmanship training.

• Phase 3: Collective dismounted critical tasks; squad movement and engagement tactics.

• Phase 4: Collective mounted critical tasks; convoy gunnery.

In April 2005, 25 personnel from 30th Medical Brigade units attended phase 1, a 1-week train-the-trainer course, at Baumholder, Germany. Soldiers assigned to a brigade scout reconnaissance troop of the 1st Armored Division provided instruction on survival techniques and discussed how they could apply lessons learned in Iraq. The train-the-trainer course included core instruction on—

• Reacting to contact and ambush.
• Calling for indirect fire.
• Launching a squad attack.
• Breaking contact.

Training on additional, more specific tasks was embedded in the core instruction. Those tasks included—

• Conducting patrol operations.
• Establishing an observation post.
• Taking action on contact.
• Reporting tactical information.
• Integrating indirect fire support.
• Conducting troop-leading procedures.
• Consolidating and reorganizing.
• Controlling civil disturbances.
• Searching suspicious civilians.
• Handling detainees.

The 30th Medical Brigade Soldiers then returned to their parent units to develop their own programs of instruction for their respective units.

At the same time, two noncommissioned officers (NCOs) were sent from brigade headquarters to Vilseck, Germany, to attend phase 2 of the training—the Small Arms Master Marksman (SAMM) Course. The SAMM Course provided instruction in—

• Basic and advanced marksmanship techniques.
• Small arms maintenance.
• Target acquisition and discrimination principles.
• Close-quarters marksmanship techniques.

With the first two phases behind them, the 30th Medical Brigade Soldiers returned to their parent units to develop their own programs of instruction for their units. The trainers moved on to phases 3 and 4—developing and presenting what they had learned to brigade staff members. These tasks proved to be a bit more challenging than previous phases. Because the 30th is a medical brigade, many of its assigned Soldiers had very little, if any, combat arms training. The training was to be as realistic as possible, and, as an additional challenge, the skills learned would be demonstrated to many Soldiers who had yet to be deployed to an actual theater of operations.

Six Soldiers—two sergeants, two sergeants first class, and two captains—from brigade headquarters were tasked with developing the training. This training support team had only 1 week before they would have to provide the training to a select group of brigade staff members. It would be their first "trial by fire." To develop a lesson plan, the team drew on their individual experiences in various assignments, many in combat, and incorporated some of the skills they had learned during phase 1.

The headquarters company commander and first sergeant promised to provide the resources needed for the training. Initially, the team developed a training plan that directly mirrored phase 1 training at Baumholder.

The training timeline was tight. With only 4 days before the first iteration would begin, each member of the training support team worked diligently to ensure that the training was meaningful and not merely a "check-the-block" event. One Soldier arranged for a training site in Heidelberg. Another called the ammunition supply point and secured ammunition to use during training. Meanwhile, other Soldiers contacted

Soldiers react to contact with the "enemy" during training.

the 1st Armored Division brigade reconnaissance team that had provided the train-the-trainer instruction and obtained information to use in developing a program of instruction.

The headquarters company commander and first sergeant and the range officer in charge (OIC) conducted a leader's reconnaissance of the proposed training site to make sure that the terrain was suitable. The general consensus was that the site could support all but one of the planned training tasks—military operations on urban terrain (MOUT) training. This shortfall proved to be only a minor problem that was overcome easily with a little ingenuity. As General George S. Patton, Jr., once stated, "Never tell people how to do things. Tell them what to do and they will surprise you with their ingenuity."

With a few minor alterations and a bit of improvisation, the group decided that a former tear gas chamber on the site could be converted into an acceptable MOUT training area. The building and its external security fence would be modified to simulate windows, and the instructors would move around the building during training to provide a realistic impression of checking windows as they moved through potential "kill zones."

Grid coordinates were set for MEDEVAC (medical evacuation) operations, and other critical training areas and terrain features were designated on a sketch map. The next step was to return to garrison, package the training plan, and brief the brigade commander.

The training support team, along with the team OIC and NCOIC, presented the training plan to the brigade commander. He approved the program of instruction and told the team that he hoped, when the training was over, each Soldier would have a better understanding of his role as a CSS enabler in a combat theater of operations.

Trial by Fire

The first day of phase 3—dismounted training—was rainy and cold. The training support team arrived at the training site at 0700 and set up the necessary training aids. The first day would be devoted to close-quarters marksmanship skills and reflexive fire techniques. The training audience would include doctors, mental health professionals, environmental science professionals, administrative support personnel, and communications technicians.

When the training audience arrived on site in Heidelberg, the instructors began with discussions of recent experiences of a variety of units and related some of their own personal experiences during Operations Enduring Freedom and Iraqi Freedom. They encouraged the Soldiers to think of new ways to employ their

teams effectively in scenarios ranging from issuing guidance in a hasty operation order briefing to reacting to an ambush to consolidating and reorganizing after a fight.

The OIC presented a safety briefing and some general training rules of engagement. He also presented a vignette that was based on a recent incident in Iraq and asked each member of the training audience to think about how he would react in a similar situation. The trainees were asked not to focus on their own specialties but on the reality of a fight for survival on the battlefield.

The training audience was broken down into three teams of 10 to 15 Soldiers each, which were designated as squads. As members of squads, the Soldiers were forced to think of themselves as members of small fighting elements. As such, they did everything together. They sat together during classes, ate together during breaks, laughed and talked together, and supported each other's decisions during situation-oriented training. As the training progressed, the focus was less on how a team fights and more on team development. Unlike combat arms units, CSS units—specifically medical units—usually do not function as teams, squads, or platoons, so the teams had to be reminded of this concept for the training to be effective.

As the end of the week approached, many of the junior Soldiers were showing confidence in their own ability to make decisions. One Soldier was overheard jokingly commenting that "bossing a lieutenant colonel around was sort of fun." Such perks were less important than one emerging certainty: They were accomplishing the tasks at hand. Soldiers were obviously benefiting from rehearsing unfamiliar tasks.

On the final day of phase 3, the Soldiers were instructed how to handle civilians on the battlefield, enemy prisoners of war, and small civil disturbances. A situational training exercise that followed incorporated all of the tasks that had been taught throughout the week. The Soldiers were issued an operation order to which they were required to respond by preparing and issuing an order to subordinate teams. When each team's leader advised the trainers that his team was ready, the exercise began.

The Soldiers were forced to react to snipers, ambushes, and civilians on the battlefield. They had to link up with a convoy and move along a designated route, where they had to react to an improvised explosive device and send appropriate reports to their higher headquarters. As each team went through the training lane, the trainers recorded observations about its performance. Following the exercise and an informal after-action review, phase 3 was complete. Each Soldier had met the commander's intent.

The trainers moved on to phase 4—mounted tasks during convoy gunnery training at the Grafenwoehr Training Area. An added challenge during this phase was that two of the instructors had been reassigned to the rear detachment command team and would not be available to assist. The OIC asked his G–3 training officer to canvass the other 25 trainers who had attended the train-the-trainer course for help. Thirteen Soldiers responded, and the training was scheduled for June on a range at Grafenwoehr.

The training support team assembled at Grafenwoehr and built a terrain model for the training audience. The training was conducted in three stages. In the first, the Soldiers conducted convoy operations with no ammunition. In the second, they conducted convoy operations using blanks. A safety team was on hand during the blank-fire training to identify potential hazards before the Soldiers moved to live-fire training. Finally, the Soldiers used live ammunition when they conducted convoy operations. With the completion of the live-fire training, each squad was certified for deployment.

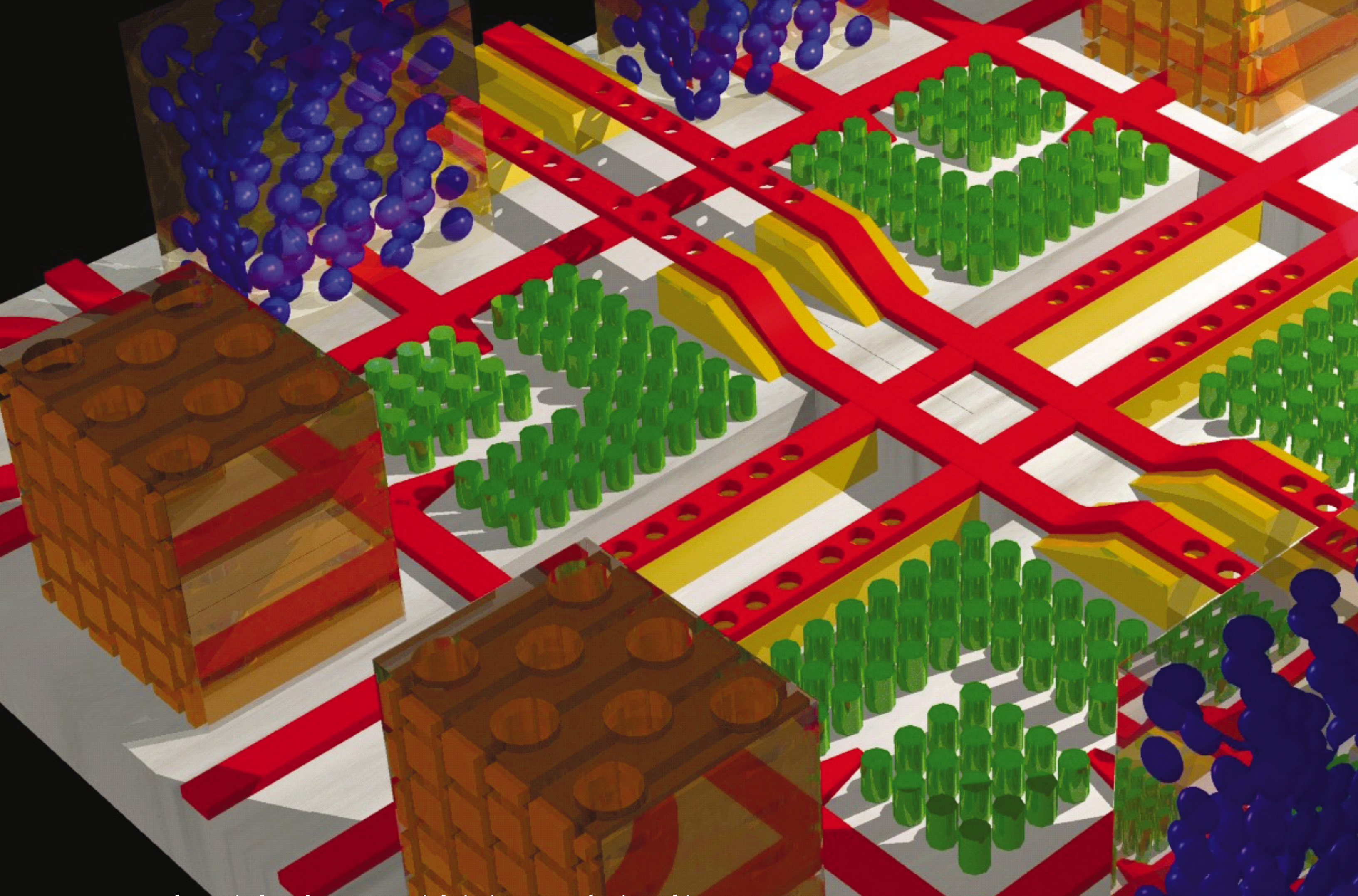
To date, more than 500 30th Medical Brigade Soldiers have been trained without personal injury or damage to equipment. During each Victory Challenge iteration, the Soldiers were usually motivated and attentive. They left the training with more confidence in their ability to attack and defend if necessary as they perform their duties, and they were eager to share with other Soldiers the life-saving lessons they learned during Victory Challenge. **ALOG**

Captain Jerry D. VanVactor is a Medical Service Corps logistics officer assigned to the G–4, 30th Medical Brigade, V Corps, in Heidelberg, Germany. He was the officer in charge of the training support team during Victory Challenge. Captain VanVactor has a bachelor's degree in health science from Athens State University in Alabama and a master's degree in healthcare management from Touro University International. He is a graduate of the Army Medical Department (AMEDD) Officer Basic and Advanced Courses, the Medical Logistics Management Course, the Support Operations Officer Course (Phase I), and the Army Contracting Officer's Representative Course.

The author would like to extend special thanks to Captain Scott Hogue, Sergeant First Class Vincente Delacruz, Sergeant First Class Lemuelle Scott, Sergeant Adrian Carreon, and Sergeant Scott Stewart, members of the Headquarters Company training support team during Victory Challenge.

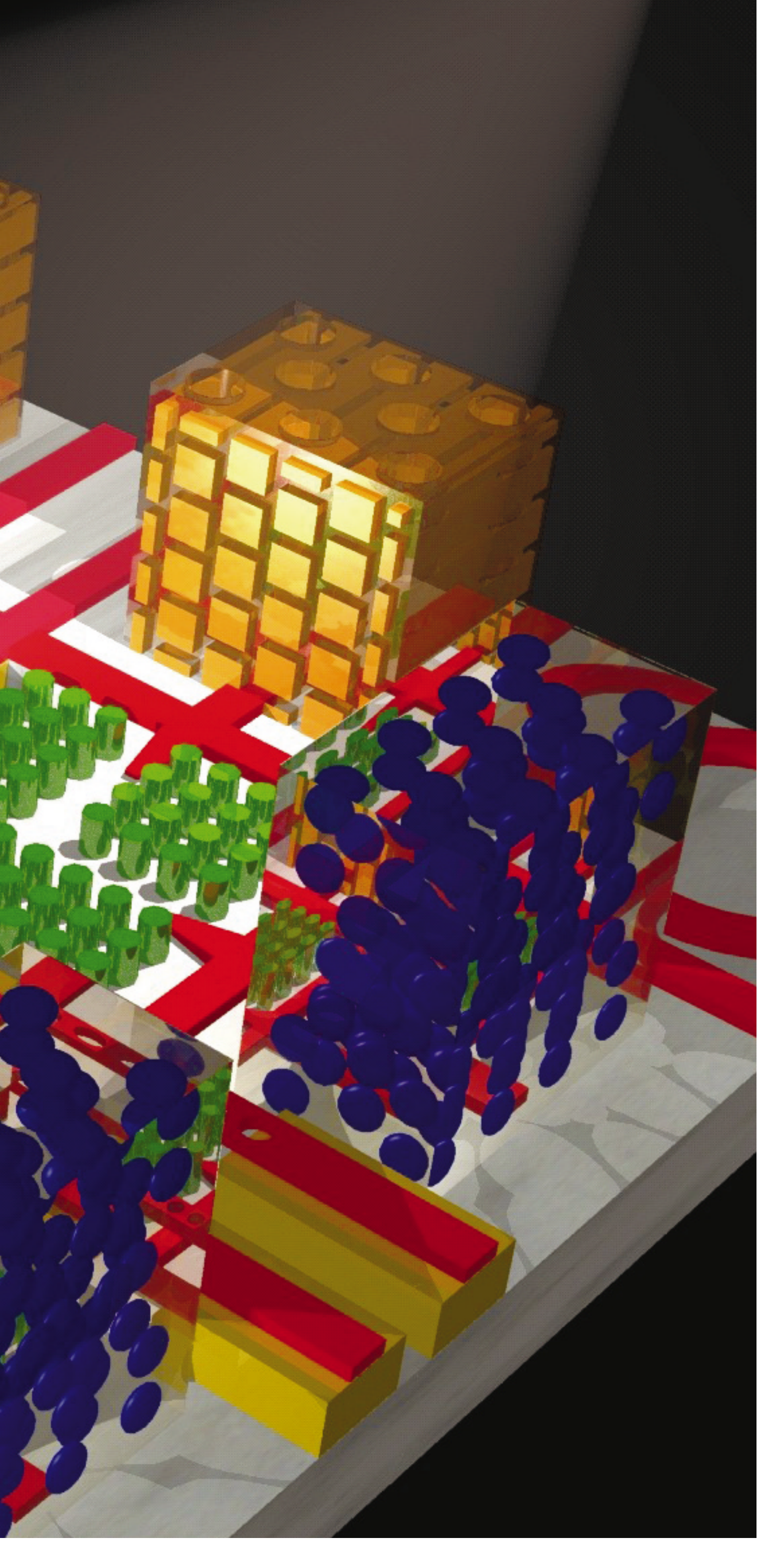
Knowledge on Demand: Communication for the Future

BY DAVID E. SCHARETT AND ROBERT E. GARRISON



Photonic band gap materials in integrated microchips could be revolutionized components of radio frequency identification (RFID) tags.

Editor's Note: This is the third and final article in a three-part series on future advanced technologies. The first article, published in the July–August 2005 issue of Army Logistician, introduced the "Revolution in Atoms, Molecules, and Photons" (RAMP) and explored the possibilities offered by RAMP for energy production and delivery. The second article, appearing in the September–October 2005 issue, introduced the extraordinary "designer" materials that RAMP research is bringing us and explored the implications of those materials for equipment readiness, demands on the supply chain, and distribution processes. This third article revisits several of the technological advances mentioned in our first two articles, but it focuses on the potential of RAMP research and development to produce new means of providing the Army logistician with what the authors call "Knowledge on Demand."



In today's military, we hear a lot of discussion about network-centric warfare. While the term might sound new, the basic concept underlying network-centric warfare—the robust networking of forces to improve information sharing and collaboration, which in turn enhances shared situational awareness—has been around since the beginning of warfare. With the advent of highly advanced sensors, which can detect enemy actions across the entire electromagnetic spectrum and which possess the ability and computing power to store, analyze, and disseminate incredible volumes of data, the U.S. military has been able to adjust its operational tactics and respond before an enemy can act. These capabilities were clearly demonstrated in Operations Desert Shield and Desert Storm and in the initial battles and drive to Baghdad in Operation Iraqi Freedom. However, those operations involved warfare against the nation-state of Iraq, and our military actions proceeded from a clear understanding of how nation-states organize for and plan military operations.

Today, and for the foreseeable future, we are faced with an enemy that does not represent a nation-state, that fights by no civilized rules, and that has shown itself to be extremely adaptive. In order to counter this type of enemy, our Nation must sustain its technological superiority if it is to maintain its dominance on the battlefield—a battlefield that, in the Global War on Terrorism, now includes the territory of the United States itself. The overriding, essential element in winning this type of warfare is having actionable knowledge, in lieu of actionable information (knowledge being considered broader, or of a higher order, than information), on such things as—

• Planned enemy activity.
• Current battles engaged.
• Equipment readiness status.
• Consumption of fuel, ammunition, energy (fuel and batteries), and water supplies (location, condition, and quantities on hand).
• Availability of other essential supplies for military operations.

Attaining this actionable knowledge is as important as having the capability to communicate such knowledge to others in a timely manner so that decisive actions can be taken. We are calling this capability "Knowledge on Demand."

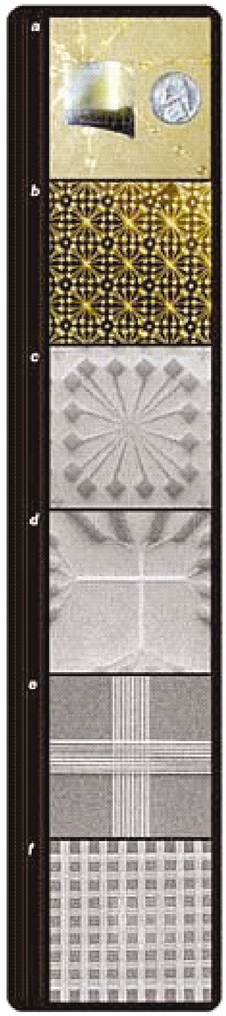
Knowledge on Demand

Research at the atomic, molecular, and photonic levels is producing revolutionary means to gather, store, assess, and disseminate data, information, and, ultimately, actionable knowledge. So what can we expect RAMP research to produce that potentially could revolutionize the logistician's ability to attain and disseminate actionable knowledge in combat-relevant time? What follows are several possibilities.

Nanoelectronics

One product of RAMP research is nanoelectronics. The term "nanoelectronics" refers to electronics at the nanoscale. It is an area that potentially offers technological advances such as—

• Pervasive computing devices. These would be tiny, even invisible to the unaided eye, devices that are



Nanoscale electrical components like these could lead to such technological advances as pervasive computing devices—tiny, even invisible devices that could be embedded in objects such as vehicles, tools, and clothing.

either mobile or embedded in almost any type of object imaginable, including vehicles, tools, and clothing.

• Intelligent equipment.

• Supercomputing, quantum computing, and artificial intelligence.

• Better screen displays and the replacement of paper.

• Improved inputs for computers and information technology systems.

• Quantum encryption, which involves sending data by way of photons (the smallest unit of light).

• High-speed networking.

The list of nanotechnologies in various stages of conception, development, and even commercialization already is large and growing. If present trends in nanoscience (the study of matter at atomic and molecular scales) and nanotechnology continue, most aspects of everyday life will be subject to change. For example, consider these advances—

• By patterning recording media in nanoscale layers and dots, the information on a thousand compact discs could be packed into a space the size of a wristwatch. Besides the thousand-fold to million-fold increase in storage capacity, computer processing speeds will make even the best computers that we have today seem slow.

• Devices that transmit electromagnetic signals, including radio and laser signals, will shrink in size while becoming inexpensive and more powerful. Everyone and everything could conceivably be linked everywhere and all the time to a future World Wide Web that feels more like an all-encompassing information environment than just a computer network.

Communications and Computing

Nanomemories and nanodisk drives, which may become commercialized this year, will offer quantum leaps in gigabytes (GBs) of storage per dollar of storage cost and in speed of access. (A gigabyte is a unit of computer memory or data storage capacity equal to 1,024 megabytes.) In fact, emerging technologies ultimately could transform the economics of computer memory storage so that a penny could buy a petabyte (one quadrillion bytes) of storage.

We also should expect to see improvements in screen display technology. Nanotechnology advances may well provide clearer pictures than even the best plasma screens can provide today. But much more importantly, nanotechnology advances can offer clearer and thinner displays for common electronic devices such as the cell phone and personal data assistant.

Enterprise networking at 8 GBs per second and above is already a reality. At this time, that level of networking is much too expensive for common use in networks. However, new semiconductor processes operating below the 100-nanometer level promise radical improvements in the economics of high-speed networking that can make it affordable.

The University of California at Los Angeles has built a high-speed, digital memory device using commodity plastics transformed by nanotechnology. The device is made from a polystyrene film containing gold nanoparticles and holds promise for low-cost and high-density memory storage.

Terahertz Communication

Terahertz (THz) radiation falls in the gap between infrared radiation and the high-frequency radio waves currently used for mobile phones and other wireless communications systems. In fact, researchers in Germany recently transmitted audio signals via THz waves. This development could lead to a new type of high-speed, short-range wireless communication network. It is predicted that wireless THz networks could one day replace wireless local area networks or Bluetooth, which is a short-range cable replacement.

Apart from a few applications in biological imaging and spectroscopy, THz communications technology has been relatively unexplored. However, as the demand for high-data-rate wireless communication continues to grow, researchers are turning to higher frequencies and are starting to explore the THz region. Two significant THz communications research initiatives are ongoing. One initiative, by the Defense Advanced Research Projects Agency, is called TeraHertz Operational Reachback (THOR). The second initiative, by the National Synchrotron Light Source facility at Brookhaven National Laboratory, is called Terahertz Lightbeams.

Metamaterials

The emerging fields of nanoscience and nanoengineering are leading to an unprecedented understanding

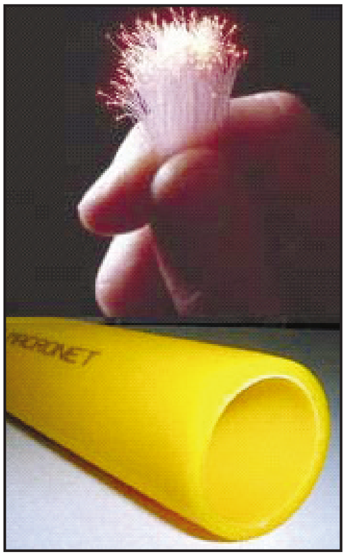
of and control over the fundamental building blocks of all physical things. This emerging technology is likely to change the way computers, and other devices and equipment not yet imagined, are designed and manufactured. One group of these "designer" materials is called "metamaterials." Metamaterials are artificially constructed materials with properties and responses that do not occur in nature. One metamaterial that is of particular interest to logisticians is photonic band gap material because it could significantly advance knowledge-on-demand capabilities for logisticians.

Silicon on sapphire (SOS) is a photonic band gap material that is revolutionizing the production of electronic chips for RFID tags. The size of this microchip is readily apparent.

Photonic Band Gap Materials

The use of photonic band gap (PBG) materials can simplify and improve the efficiency of microchips. Recent advances in microstructuring technology have allowed the controlled engineering of three-dimensional PBG structures that are capable of controlling electromagnetic radiation in the near-infrared as well as the visible frequencies of the electromagnetic spectrum. Light in certain engineered dielectric microstructures can flow in a way similar to electrical currents in semiconductor chips. These microstructures provide a foundation for developing novel microphotonic devices and the integration of such devices into an optical microchip.

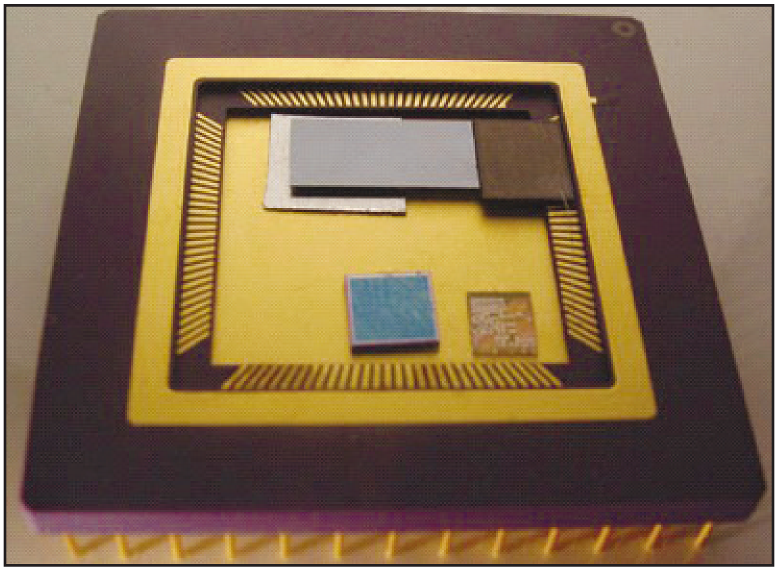
The current state of PBG research suggests that this field is at a stage comparable to the early years of semiconductor technology, shortly before the invention of the solid-state electronic transistor. If this analogy continues to hold, one may find PBG materials at the heart of a 21st century revolution in optical information technology similar to the revolution in electronics we witnessed over the last half of the 20th century.



Photonic band gap materials use light to transmit information. These materials are similar to semiconductors, except that electrons are replaced by photons of light.

A PBG material that is helping to revolutionize the production of electronic chips and radio frequency identification tags is silicon on sapphire (SOS), which uses light as a transmission medium. Using light beams instead of wires, a team of engineers at Johns Hopkins University devised a means of significantly increasing the speed at which signals move at the electronic chip level. Their method involves a hybrid integration approach that uses layers of silicon on a synthetic sapphire substrate. SOS is an integrated circuit manufacturing technology used to make radiation-hardened chips for aerospace and military applications. Typically, high-purity, artificially grown sapphire crystals are used. The advantage of sapphire is that it is an excellent electrical insulator that prevents stray currents caused by radiation from spreading to nearby circuit elements.

With SOS technology, incoming signals are converted into laser light, which is sent through the transparent sapphire substrate and then collected and routed, via integrated microlenses and optical components in the chip structure, to other portions of the chip or to adjacent chips via an optical fiber. This method promises to increase transmission speeds up to 100 times over current methods. The technology also allows the chip to operate with less power since the sapphire substrate is an insulator, not a semiconductor, thus avoiding power dissipation through parasitic



A nuclear microgenerator (gray rectangular pieces) powers a simple processor (blue square) and a photodiode (smaller square). Packaged as a chip, the device works as a self-powered light sensor for optical communications.

capacitance (an impeding of transmission). This SOS technology is an improvement over the current bulk SOS processes and also allows issues of packaging and interoperability interface to be addressed at the wafer fabrication level.

According to the market research firm NanoMarkets, a new generation of platforms and applications will be enabled by "nanochips." Nanochips are integrated circuits so small that individual particles of matter play major roles. NanoMarkets predicts that within the next few years we may see advances that include—

• Pervasive computing machines. These are a new class of computers that will make information access and processing available to anyone from any location at any time. Pervasive computing has been talked about for some time, but new types of processors, made viable by nanotechnology, promise that it will at last become a reality.

• Electronic paper. This technology will realize the decades-old dream of an effective digital replacement for dead trees.

• Nano-intelligent equipment. Nanotechnology promises a dramatic leap forward in the price-to-performance ratio of processors and will produce a new generation of truly artificially intelligent equipment that will efficiently process voice, image, and sensory inputs fed to them by nanosensors.

• Nano-enabled security, control, and monitoring. Nanosensors will deliver information about product types, personal identity, environmental conditions, and more to a new generation of inventory control, security, environmental, and health control monitoring systems.

Piezoelectric Materials

Piezoelectric materials are materials that change their shape when an electric voltage is applied and produce a charge when pressure is applied. Piezoelectric nuclear microgenerators have direct applications in shipping and receiving of cargo and pre-positioning of commodities at remote sites. These microgenerators could supply energy to operate embedded microchips that monitor, record, and transmit information on—

• Environmental conditions experienced by cargo, such as vibration, shock, temperature, humidity, and tampering.

• Layered in-transit visibility, such as the visibility of individual pieces inside a carton, cartons in a pallet or container, or pallets or containers in a transportation platform.

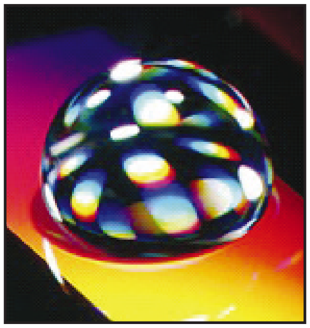
• Extreme-duration power sources used for asset monitoring at pre-positioned force, equipment, or supply sites.

Rare Earth Aluminum Oxide Materials

By melting and cooling levitated material, scientists can understand not just its formation but also its inherent physical properties. ("Levitated material" is produced by an electromagnetic field.) The process allows researchers to saturate a levitated glass they make with a number of attractive properties, such as chemical stability, infrared transmission, and laser activity; other glasses tend to have just one of these properties. The resulting rare earth aluminum oxide materials could serve as the centerpiece for new medical and industrial lasers. They also have broadband Internet applications.

Replacing Transistors in Computing

Challenging a basic tenet of the semiconductor industry, researchers at Hewlett-Packard Company have demonstrated a technology that could replace the transistor as the fundamental building block of all computers. The device, called a crossbar latch, can be made so small that thousands of them can fit across the diameter of a human hair, enabling the high-tech industry to continue to build ever-smaller computing devices that are less expensive than their predecessors. These crossbar latches are purported to be more reliable than today's transistors and therefore would increase the mean time between failures in electrical components that use them.



Nanograss materials like this are produced by new techniques of controlling the behavior of tiny liquid droplets.

Nanograss

Nanograss is a new class of structure resulting from researchers nano-engineering the surface of a material. Nanograss is produced by an entirely new method of controlling the behavior of tiny liquid droplets by applying electrical charges to specially engineered silicon surfaces that resemble blades of grass. This new technique of manipulating fluids has many potential applications, including thermal cooling of integrated circuits for powerful computers, creating novel photonic components for optical communications, and producing small, low-cost "lab on a chip" sensor modules.

Other possibilities include altering the properties of nanograss by applying ultrasound or a small voltage of electricity to change its temperature. Applying ultrasound or voltage causes a buildup of an electrical field at the tips of the nanograss, which changes its wettability through an effect called "electrowetting." ("Wettability" is the ability of any solid surface to be wetted when in contact with a liquid; that is, the surface tension of the liquid is reduced so that the liquid spreads over the solid surface. "Electrowetting" describes how a water droplet in contact with a water-repellent surface will begin to spread out in the presence of an electric field.)

Electrowetting could allow the electrodes and electrolytes in a battery to remain separated until the battery is needed, thus extending the battery's shelf life—something that would certainly benefit the logistics community. Conventional batteries, on average, will discharge at the rate of 3 to 5 percent a month, even when not in use. According to research predictions, nanograss batteries will cost less and have far higher power-to-weight ratios than conventional batteries. Within the next 3 to 5 years, nanograss technology also might be used in switches, power splitters, filters, multiplexers, and other devices in order to manipulate light in ways that currently are too difficult to achieve using conventional means.

Holographic Drives

Holographic storage drives able to record up to 10 times more data than the next generation of direct video drives are set to become commercially available this year. These holographic drives will have a storage capacity of 200 GBs of data—the equivalent of 98 million printed pages, or roughly 200,000 one-megabyte photos. This technology could lead to the production of a 1.6-terabyte drive by 2010. (A terabyte is one trillion bytes. All of the books held by the Library of Congress contain about 20 terabytes of text.)

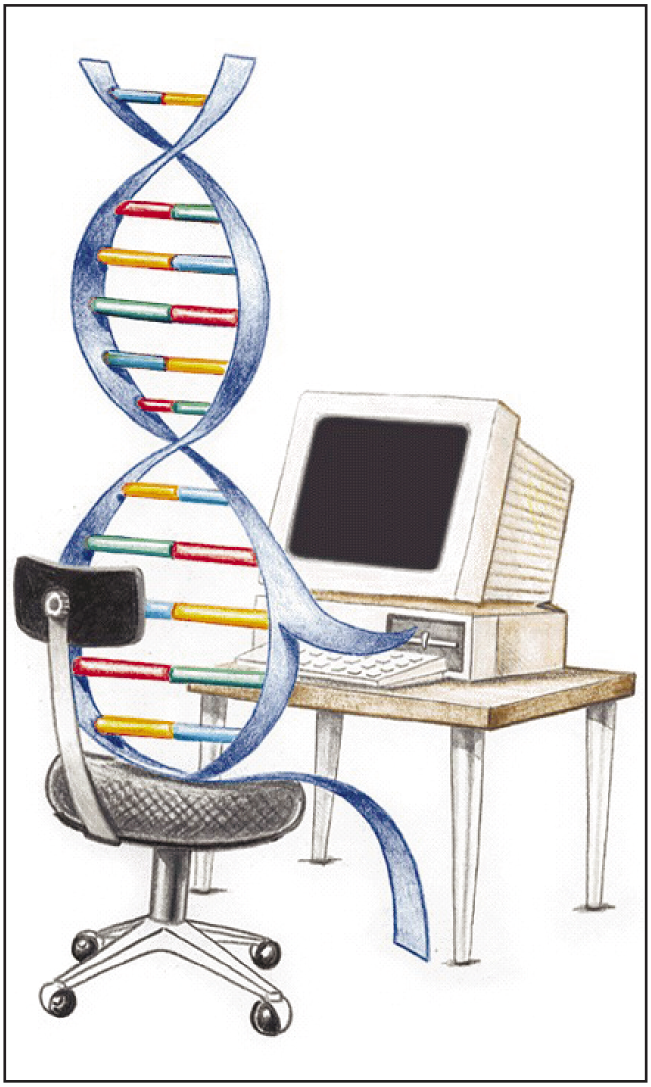
The attraction of holographic storage is that hundreds of separate holograms, known as pages, can be recorded through the full depth of the storage medium. Unlike related technologies, which record one data bit at a time onto the surface of a disc, holography allows 1 million bits of data to be written and read out in a single flash of light. This means that a postage stamp-sized piece of media could be used to store 2 GBs of data and have a transfer rate in excess of 20 megabytes per second. The cost of this media is expected to be as low as 25 cents per GB with an architecture that is anticipated to produce terabyte-capable drives. An added bonus to storing data through this medium is that its contents would be difficult for unauthorized personnel to access.

Genetic Programming

Genetic programming (GP) is an automated method for creating a working computer program. GP starts with a high-level statement of "what needs to be done" and automatically creates a computer program to solve the problem. Evolutionary methods, such as GP, have the advantage of not being encumbered by the preconceptions that tend to limit human problem-solving to well-explored paths. GP is one of the techniques in the field of genetic and evolutionary computation, which in turn includes techniques such as genetic algorithms, evolution strategies, evolutionary programming, grammatical evolution, and machine code (linear genome) genetic programming.

GP starts with a primordial (a basic principle) ooze of thousands of randomly created computer programs. These programs progressively evolve over a series of generations. The evolutionary search uses the Darwinian principle of natural selection ("survival of the fittest") and analogs of various, naturally occurring operations. There are numerous GP applications, including—

- Black art problems, such as the automated synthesis of analog electrical circuits, controllers, antennas, networks of chemical reactions, and other areas of design.
- Programming the unprogrammable, which involves the automatic creation of computer programs for unconventional computing devices such as cellular automata, multi-agent systems, parallel systems, field-programmable gate arrays, field-programmable analog arrays, ant colonies, swarm intelligence, and distributed systems.



Genetic programming (symbolized by this figure of a DNA molecule working at a computer work station) is an automated method of creating a working computer program. It does this by borrowing from biological principles of natural selection and analogs of various naturally occurring operations to "evolve" programs that solve very complex problems.

- Commercially usable new inventions, which involve the use of GP as an automated "invention machine."
- Human-competitive machine intelligence, which is an evolving area for GP.

Quantum Computing

Teleportation is the transfer of a quantum mechanical state between two particles. Because the transfer takes place without an exchange of matter, it is reminiscent of the well-known command, "Beam me up," from the *StarTrek* television series. Teleportation of isolated particles was invented 10 years ago and demonstrated for photons in free space. Since then, researchers have found a way to teleport an electrical charge in a solid state. This discovery could be used to transfer quantum mechanical bits ("qubits") in a quantum computer. (A qubit is the smallest unit of information in quantum computing and holds an exponentially larger amount of information than a traditional "bit.")

Modern computers all operate on the same basic principle: they perform calculations by manipulating individual transistors that represent a single bit of information (either a "0" or a "1"). Quantum computing takes an entirely different approach, using qubits that, through the magic of quantum physics, can be "0" and "1" at the same time. Thus, a single qubit can store and process twice the amount of information as a bit. Combining qubits delivers exponential improvement. For example, 2 qubits are four times more powerful than 2 bits, which means a 64-qubit computer theoretically would be 18 billion trillion times more powerful than the latest 64-bit computer—an impact on computing power that is beyond imagination.

Researchers recently have produced the first usable quantum processors. These initial prototypes are of little commercial use, but the achievement is significant because it represents a major milestone in the quest for virtually limitless computing power. Ubiquitous knowledge on demand for logistics on a global scale is thus one step closer to reality.

Quantum Cryptography

Quantum cryptography uses a stream of single photons to transfer a secret key between a transmitter and a receiver. Each transmitted bit of the cryptographic key is encoded on a single photon. Any attempt to intercept the key changes the quantum state of the photons, which reveals the presence of a hacker.

A team of scientists at NEC Corporation in Japan claims to have smashed the transmission distance record for quantum cryptography. The team says it successfully sent a single photon over a 150 kilometer-long fiber-optic link. This significantly exceeds the previous record of 100 kilometers, which was recorded in June 2003. The NEC's record-breaking system relies on planar light-wave circuit technology and a low-noise photon receiver. The system was developed by a collaboration of researchers from NEC, the Telecommunications Advancement Organization of Japan, and the Japan Science and Technology Agency.

According to NEC, its system has two distinct benefits—

- Stable, one-way photon transmission, which reduces the noise of backscattered photons from the

optical fiber to less than one-tenth that of conventional round-trip systems.

• An alleged 10-fold increase in signal-to-noise ratio compared with current systems, thanks to the receiver's increased sensitivity to photons that have been broadened by dispersion in the long fiber-optic link.

The first computer network in which communication is secured with quantum cryptography is up and running in Cambridge, Massachusetts. This is a Defense Advanced Research Projects Agency-funded project in which the data flow through ordinary fiber optic cables that stretch 10 kilometers. Researchers at Los Alamos National Laboratory in New Mexico have built a portable system that will allow electronic messages to be transmitted to and from satellites 300 kilometers above the Earth in absolute secrecy. At the moment, computers capable of quantum cryptography are large and expensive because they are custom-made prototypes. However, as this technology matures, the size and cost of its components will decrease.

According to NEC, future systems can produce quantum cryptography transmissions in an optical network in metropolitan areas and are expected to contribute to the realization of an optical-fiber network system providing advanced safety levels that prevent code-breaking.

The United States is experiencing an unprecedented period of adjustment as it transforms its combat forces for the future while executing the Global War on Terrorism. As Army and joint combat forces alter their concepts of deployment and employment, modernization of the logistics systems that support them must continue. Achieving dominance across the entire range of combat operations, particularly operations dealing with asymmetric threats, poses considerable logistics challenges. As logisticians, we need to continue to transform the way we model, design, deploy, and sustain our forces. We, as logisticians, must stay abreast of significant discoveries in new technologies and applications that will benefit Army and joint logistics operations. We should stand ready to incorporate these technological advances into our systems and business processes to maximize the benefits those advances offer through reductions in cost, time, and manpower and increases in equipment readiness.

This series of articles has sought to provide insights into the future potential for Army and joint logistics of research and development at the atomic, molecular, and photonic levels—the Revolution in Atoms, Molecules, and Photons. RAMP research significantly affects three scientific areas of utmost importance to Army and joint logisticians: energy, materials, and communication (in the broadest sense). Now, and to an even greater extent in the future, resupply of energy on the battlefield is a pervasive issue that must be addressed. Material research is another crosscutting scientific area that first and foremost affects system, component, and part reliability. And the drive toward a global, joint network-centric capability requires advances in communication technologies such as data source collection and data collation, storage and analysis, knowledge management and decision support, and information dissemination.

The Army's scientists and engineers are expanding the limits of paradigm shifts through transformational technology applications that will give our Soldiers unprecedented capabilities to achieve decisive victories. RAMP is the key that will lead to those victories. It is pervasive in all areas of research today. The Federal sector, private enterprise, academia, and international organizations are increasing funding for developmental applications. The products of these technologies can and will provide significant benefits to Army and joint logistics in the months and years to come. The Army's logisticians must be deeply involved and ready to apply the tremendous benefits gained from RAMP research as we move forward in the 21st century.

ALOG

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PMCS: Key to Readiness During Deployment

BY SERGEANT JERMAINE BOYD

High operating tempo and low manning levels make preventive maintenance checks and services an ongoing challenge during deployment. To ensure equipment readiness, commanders must enforce unit standing operating procedures and be vigilant of developing trends.

Routine preventive maintenance checks and services (PMCS) are no match for the environmental extremes of Iraq and Kuwait. During sandstorms, sand is sucked into engines, where it wreaks havoc on moving parts, adding years of wear and tear in mere months. Intense heat and airborne dust cause vehicle starters and generators to fail and air, fuel, and oil filters to clog. Weekly command maintenance is needed to ensure the readiness of all equipment, including ground vehicles, weapons, communications equipment, night-vision devices, and nuclear, biological, and chemical equipment.

Training

Before deployment, Soldiers must be trained to operate and maintain the equipment they will support in theater. Army National Guard and Army Reserve mechanics working with Active Army units may be unfamiliar with the stay-behind equipment (SBE) they fall in on. Untrained and sometimes unlicensed operators are a safety risk and can cause unnecessary wear and tear on vehicles. All operators must be trained and licensed before deployment.

Reserve component maintenance units often arrive in theater without the special tools and test equipment they need to maintain equipment. For example, the AN/GRM–122 radio test set is needed to verify, test, and repair Single-Channel Ground and Airborne Radio System (SINCGARS) radios and their associated line-replaceable units. The Army Materiel Command (AMC) SBE property book officer can help units gain visibility of stay-behind systems.

Connectivity

Most units in the field experience sporadic connectivity, often because of inadequate systems training. Basic standing operating procedures (SOPs) that are used to train Soldiers to operate Standard Army Management Information Systems, such as the Unit Level Logistics System (ULLS), at their home stations may not be adequate in a deployment environment. Operator and supervisor training on these systems must be expanded to include training on the type of operations and equipment likely to be encountered at the new location. For example, operators and supervisors must be trained on new data transfer and unit identification code (UIC) architectures, operation and setup of Very Small Aperture Terminals

Military policemen tighten the lug nuts on their M1117 armored security vehicle at Camp Liberty, Iraq.

Soldiers at Camp Victory in Iraq check for leaks under a high-mobility, multipurpose, wheeled vehicle.

(VSATs), and Combat Service Support Automated Information Systems Interface (CAISI) connectivity. It is important that operators and supervisors be trained *before* the unit deploys.

ULLS–Ground is a critical tool during deployment. It automates unit supply, maintenance, and materiel readiness management operations. It also can be used to prepare unit supply documents, maintenance management records, readiness reports, and property records. To maximize the utility of the system, the ULLS–Ground software must be loaded properly onto the operator's computer and the supporting parameters set to interface with the Standard Army Maintenance System and the Standard Army Retail Supply System. Unit combat service support automation management offices may be able to help ensure that important equipment data, such as equipment readiness codes and national stock numbers, are loaded.

Fleet Readiness

Low vehicle density means that available vehicles are used extensively, which negatively affects fleet readiness. For example, DV43 rough-terrain container handlers have been used in several Operation Iraqi Freedom rotations and have had consistently low readiness rates. Increased PMCS and operator training are essential to improving the readiness of this equipment.

The high operating tempo (OPTEMPO) and harsh environmental conditions in Iraq have spurred a high demand for repair parts for certain vehicles. Transmissions for M2 Bradley fighting vehicles are a good example. Mileage on Bradleys driven 1 month in Iraq exceeds that for a similar vehicle driven 1 year elsewhere. The extra weight of the Bradley reactive armor—approximately 5,000 pounds—and the high OPTEMPO in the area of operations are causing frequent failures of their transmissions. Failure trends such as this highlight the importance of PMCS and proper scheduled maintenance.

Fuel Systems

The use of JP8 fuel in a hot environment can lead to loss of power, injector system failure, and malfunction of components such as fuel pumps. Transmission fluid or motor oil is sometimes added to ground equipment fuel to reduce friction in the engines' moving parts; however, this practice is not sanctioned by the system project managers or AMC. Units must ensure that training for maintenance operations in hot weather includes fuel system troubleshooting and diagnosis, including examination of pumps, injectors, fuel lines, filters, and separators.

Collateral Maintenance Requirements

Vehicles in Iraq that are equipped with add-on armor also are equipped with commercial air-conditioning units to provide ventilation. Maintaining these units can be critical to mission accomplishment. National stock numbers and part numbers for components of these air-conditioning units have just begun to enter the supply system. Many units supporting Operation Iraqi Freedom have had difficulty getting proper repair parts, cleaning and maintenance tools, and refrigerant needed for their vehicle air-conditioning systems. Without air conditioning, many vehicles are deadlined during hot weather. Operator and maintainer training before deployment should include proper PMCS of air-conditioning systems, and prescribed load lists should include repair parts and special tools and test equipment needed to maintain the systems.

PMCS must be command driven and enforced to ensure proper care of equipment. High OPTEMPO, low vehicle density, and insufficient manning levels require commanders to monitor maintenance trends and enforce a carefully written SOP in order to maintain equipment readiness on the battlefields of Iraq.

ALOG

Sergeant Jermaine Boyd is a light-wheel vehicle mechanic assigned to the Corps Distribution Command, 1st Corps Support Command, at Fort Bragg, North Carolina. He recently redeployed from Logistics Support Area Anaconda in Balad, Iraq.

Munitions Support in the Iraqi Theater

BY MAJOR JAY C. LAND

Soldiers had to polish their rusty ammunition-handling skills when they were tasked with operating ammunition supply points in Iraq.

"Back to basics" could be used to describe the lessons that have been learned by the 1st Corps Support Command (COSCOM) (Airborne) Munitions Division (Airborne) since it deployed to Iraq to support the Multinational Corps-Iraq (MNC–I). Our Soldiers were tasked to manage four Army ammunition supply points (ASPs) dispersed across the Iraqi theater. For this role, they had to dust off their ammunition-handling and ASP-operating skills, deploy, and quickly transition from logisticians to warfighters.

Because contractors have operated Army ASPs for the past several years, Soldiers have not been adequately trained to do so—a fact that took a toll on those who had to assume the task. To ensure that Soldiers charged with managing and operating ASPs in the future are better equipped, leaders at all levels must ensure they are thoroughly trained and cross-trained in these basic skills—

- Forecasting.
- Expenditure reporting.
- Munitions reporting.
- Use of the Training Ammunition Management Information System-Redesign (TAMIS–R).

Forecasting

In normal garrison operations, unit ammunition managers are conditioned to open Department of the Army (DA) Pamphlet 350–38, Standards in Weapons Training Requirements Authorization (the "STRAC" [Standards in Training Commission] manual), complete a DA Form 581, Request for Ammunition Issue/Turn-In, and submit it. Presto! Forecasting is over and done in a few steps.

In a combat environment, however, things are a bit different. It is incumbent on the munitions staff to work closely with the G–3 staff to anticipate a unit's operational needs and prevent possible overexpenditure of stocks when combat operations bump up the unit's operating tempo. Units can forecast ammunition requirements accurately and justify increased orders by first performing a robust mission analysis that concentrates on weapons density and anticipated expenditures.

Historical expenditures can be used as a basis for forecasting future operational requirements. For example, a recent combat operation in Iraq against armed insurgents required nearly twice as many 5.56-millimeter, 7.62-millimeter, and 155-millimeter illumination rounds (used to spot infiltrating troops) as during routine operations. Based on this statistic, a proactive unit munitions manager would double the number of rounds he requests when combat operations are planned or expected in the future.

Expenditure Reporting

Reporting goes hand in hand with forecasting and must be done daily in combat operations. One issue that the 1st COSCOM Munitions Division has worked to resolve during this deployment stemmed from the fact that many units either were reporting their expenditures incorrectly or were not reporting them at all. Munitions staffs became frustrated when requisitions were not filled or were delayed because of incomplete and inaccurate expenditure reporting. In the future, expenditure reporting should be a primary element of deployment mission training.

Munitions Reporting

Like expenditure reports, timely munitions reports (MUREPs) are critical to mission success. Together, the two reports provide an accurate picture of a unit's "munitions health." The MUREP resides on the SIPRNET [Secret Internet Protocol Router Network] and is used to monitor critical munitions on hand. Since users must have established user names and passwords to access the system, a major hurdle that is often encountered in theater results from the lag between the time a deploying unit requests a password and the time it is received. Without a password, the unit has only the ammunition basic load that it drew before deploying, and it is unable to request more ammunition or submit a munitions report. During this time, upper echelons have no visibility of the unit's reports and therefore cannot focus on issues typically identified in them. Units can prevent this from happening by requesting new user names and passwords before they leave their home stations. This will save leaders valuable time that they can devote to other planning details.

TAMIS–R

This automated system processes, stores, and retrieves data on requirements for, and use of, training

A 1st COSCOM Munitions Division Soldier inspects aviation flares at Logistics Support Area Anaconda in Balad, Iraq.

ammunition. Most, if not all, units were already using TAMIS–R to request their training ammunition. As we moved forward, MNC–I directed the use of TAMIS–R to request operational loads as well. This requirement was a challenge for units that had little or no experience with the system. To remedy this situation, we deployed several training teams to the forward operating bases to train units to use the system properly.

MNC–I, and the Army itself, are moving to an automated, paperless system for requesting munitions. The speed of battle and constantly changing scenarios have dictated that logisticians move quickly to streamline the supply chain so that it will operate more efficiently. Learning to use TAMIS–R properly is an integral step in accomplishing this. Therefore, units must integrate a training program to better prepare themselves for the daily use of the system in a fluid environment.

Training

How should we train? Trainers should develop scenarios based on actual events encountered over the scope of Operations Iraqi Freedom and Enduring Freedom deployments. These scenarios should incorporate as much cross-training as possible. For example, Soldiers should be required to work as division ammunition officers. In this capacity, they would be required to coordinate with other staff elements and, based on named warning orders, operation orders, and fragmentary orders, prepare logistics status reports, MUREPs, weapons density reports, and expenditure reports that reflect the increased requirements of an upcoming operation. By broadening the experiences of all of its Soldiers, the unit's capabilities will be maximized.

The combat logisticians of the 1st COSCOM Munitions Division served with tremendous distinction during their deployment to Iraq from November 2004 to November 2005. Ammunition, as vital to Soldiers as MREs (meals, ready to eat) or fuel, flowed throughout the theater with minimal disruption. In fact, as a result of the forward thinking and astute planning involved in preparing for the Iraqi elections in January 2005, ASPs across the theater were stocked well above standard stockage objectives, which ensured that ammunition would not be an issue for anticipated follow-on operations.

The overarching lesson learned by the 1st COSCOM Munitions Division during its deployment is that ammunition handlers and ammunition officers should be placed back into home-station ASPs. Our Soldiers are being denied valuable and necessary training because the functions of their specialties are being outsourced to contractors.

It is true that we will turn over the theater to various contracting agencies to continue the sustainment as we draw down forces and redeploy. However, if we expect our Soldiers to perform at their maximum capabilities during future combat and contingency operations, we must provide them the best possible training. The best possible training for ammunition handlers and ammunition officers is daily exposure to an ASP environment and hands-on training. By paying attention to the details and gaining proficiency in these areas, we as sustainers will be able to move ammunition around the battlefield with greater efficiency, which will ensure timely and accurate munitions support of our warfighters. Placing Soldiers back into the daily operation of ASPs will give them an opportunity to practice and hone the basic skills they need to fight and win today's wars. **ALOG**

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Obtaining Visibility of Stay-Behind Equipment

by Chief Warrant Officer (W–3) Khuntae RaeGail Burke

Establishing visibility of stay-behind equipment is time consuming and can even pose a danger to the Soldiers involved.

Property managers are the cornerstone of property accountability discipline throughout the theater of operations. They are a vital link in the supply chain on which the Multinational Coalition-Iraq (MNC–I), the Combined Forces Land Component Command (CFLCC), major support commands (MSCs), and the Department of the Army (DA) depend to get an accurate picture of equipment that is on the ground. Efforts to attain total asset visibility in the theater of operations began yesterday; today, we must "lean forward" to maintain and improve total asset visibility in current and future operations.

Before I deployed to Iraq as part of Operation Iraqi Freedom (OIF) III, I knew that it was difficult to gain visibility of stay-behind equipment (SBE) that had been deployed during OIF I. However, I did not realize the severity of the problem until I had served as the property book officer for Headquarters, Corps Distribution Command, 1st Corps Support Command, for 30 days or so.

My predecessor had used the Standard Property Book System-Redesign (SPBS–R), a system that has been around for over a decade. With SPBS–R, equipment is tracked by property book unit identification code (UIC) or installation code. Unfortunately, SPBS–R was of little help in resolving the ongoing SBE visibility problem because it could be manipulated easily by substituting inaccurate line numbers for primary line numbers in order to maintain a high unit status report rating for equipment on hand.

PBUSE

To establish visibility of SBE in theater, we had to conduct extensive research to obtain data on equipment deployed during OIF I and enter the data into the newly fielded Property Book and Unit Supply-Enhanced (PBUSE) system.

Although PBUSE did not completely solve our visibility problems, it has some distinct advantages over SPBS–R. A significant advantage of PBUSE is that equipment transfers can be made before units arrive in country. If a deploying unit's property book officer does not deploy, there is no need for supply sergeants to hand-carry unit transfer request disks and a copy of the primary hand receipt to the forward property book officer as was done in the past. Instead, the rear property book officer can process the transfer with only the UIC of the forward property book. This process takes a matter of minutes and allows the forward property book officer to review the hand receipt before the unit arrives. When the unit arrives in country, the hand receipt is ready for the primary hand receipt holder (usually the unit commander) to sign.

In the stand-alone mode, PBUSE can be linked to tactical networks using satellite communications, which allows units to use the system to synchronize data while in transit. However, bandwidth problems sometimes make it difficult to connect to the NIPRNet (Unclassified but Sensitive Internet Protocol Router Network) in the stand-alone mode because PBUSE often times out before NIPRNet connectivity is made. Having a Very Small Aperture Terminal (VSAT) would be a big help to units that are deployed in areas where NIPRNet or SIPRNet (Secret Internet Protocol Router Network) connectivity is sporadic.

Processing Military Standard Requisitioning and Issue Procedures (MILSTRIP) transactions in the supply support activity (SSA) is challenging because it is

difficult to maintain file transfer protocol (FTP) connectivity. To make file transfer more efficient, all PBUSE systems should have static Internet protocol (IP) addresses (permanent numeric identifications that are assigned by the network administrator to a node in an IP network) and operators in the SSA must be fully trained on the processes involved in migrating SPBS–R data to PBUSE.

Some equipment visibility problems are personnel driven. For example, when I arrived in theater, property book UICs and type authorization codes were not being thoroughly validated or were often inaccurate. More than 90 of the 400 hand receipt accounts at Camp Victory and approximately 70 of the 300 accounts at Logistics Support Area Anaconda were delinquent. Some unit commanders had not conducted monthly inventories or signed their initial installation property book hand receipts.

Total asset visibility in a theater of operations remains a problem. Headquarters, DA, can see only the assets that have automatically migrated or been entered manually into PBUSE. The accountability process will not work unless commanders take an active role and ensure that all property is on the appropriate property book and keep the property book officer abreast of transactions that must be processed if a discrepancy exists. Property managers must ensure that the correct property book identification codes and type authorization codes are entered when using PBUSE.

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Janice W Heretick

Janice W. Heretick, 29 August 2005.

Combat Blood Operations in Iraq

BY FIRST LIEUTENANT MARIA F. JOHNSON

Providing blood for injured Soldiers during combat operations is a complex task. A blood supply unit from Germany overcame the challenges it encountered in Iraq to meet the needs of Soldiers there.

In January 2004, 10 Soldiers from the Blood Platoon, 226th Medical Logistics Battalion (Forward), 30th Medical Brigade, in Miesau, Germany, deployed to Balad, Iraq. Their mission was to serve as the blood supply unit (BSU), supplying class VIIIB (blood and blood products) for Operation Iraqi Freedom (OIF) II. The dynamics of rapid-paced combat operations required those in the blood supply chain to adapt quickly and make on-the-spot decisions.

Operational Challenges

The austere environment in Iraq presented unique challenges to blood distribution operations. Many of these challenges resulted from a sporadic communications capability and the exceptionally short shelf life of many of the blood products. Additionally, insurgent activities increased during the months of April and November 2004, producing increased casualty rates for coalition forces and Iraqi civilians. These increases in hostilities and subsequent injuries increased the need for blood products exponentially.

During the first 6 months of the deployment, blood shipments to the BSU were unpredictable and the average shelf life of packed red blood cells (PRBC) received was about 12 days. The rapid expiration of PRBC supplies tested the blood distribution chain by increasing the need to procure blood products, monitor blood products on hand, and distribute them to meet needs. The limited PRBC storage capabilities of forward support teams created additional problems. Many of the challenges that the BSU faced were reduced when, later in the operation, it started receiving PRBC with a shelf life of at least 14 days.

The 226th BSU supported nearly twice the medical treatment facilities (MTFs) recommended for one BSU. The supported facilities included Army combat support hospitals and forward support teams, Air Force expeditionary medical support and expeditionary wings, Navy MTFs, and a Polish MTF. The BSU also provided emergency support to the Allied hospital in the Spanish sector in April 2004, when operational conditions exceeded the hospital's blood supply capabilities. Because of this additional demand and the increased use of blood for wounded coalition members, insurgents, and civilians, the BSU functioned at a capacity well above normal during April.

Blood Shipments

The 226th BSU received routine blood product shipments once a week from the blood transshipment center in Qatar in quantities that were based on the requirements of ongoing missions. The average weekly shipment contained 450 units of PRBC, 100 units of Cryoprecipitate, and 60 units of fresh frozen plasma.

Blood Products

Packed red blood cells (PRBC) are collected from individual donors and packed into a small package for transfusion to a patient. Packed red blood cells do not provide viable platelets or clinically significant amounts of clotting factors.

Cryoprecipitate is the product (rich in factor VIII clotting factor) formed when normal blood plasma is cooled.

Fresh frozen plasma is taken from whole blood and frozen within 8 hours of collection. It contains normal concentrations of clotting factors.

The BSU initially used medical evacuation (MEDEVAC) assets to transport blood from the BSU to the MTFs throughout Iraq. However, this presented a problem for the MEDEVAC units because too much of their time was being used exclusively for transporting blood products rather than their primary mission—evacuating casualties. To augment its means of transporting blood products and reduce its use of the MEDEVAC system, the BSU established routine air shipments using Army fixed- and rotary-wing aircraft.

The BSU monitored the blood products on hand at the different MTFs and their projected rates of consumption to determine the quantity that should be shipped routinely by air. Air movement requests were submitted 48 hours before the stocks on hand in the

A medical specialist inventories packed red blood cells before shipping them to one of the 22 medical treatment facilities supported by the 226th Blood Supply Unit during Operation Iraqi Freedom II.

MTFs were expected to be critically low. By working air requests through the 1st Corps Support Command movement control cell, the BSU was able to use opportune airlift, including C–23 Sherpa airplanes and CH–47 Chinook and UH–60 Black Hawk helicopters. ("Opportune airlift" refers to aircraft that were scheduled for other missions and had space available to transport the blood products.) In fact, nearly 90 percent of MTF blood shipments were sent as routine shipments using opportune airlift rather than using MEDEVAC flights. However, MEDEVACs were used extensively to transport emergency blood shipments.

Blood Management

The Joint Blood Program Office (JBPO) and the BSU used disposition and transfusion reports to track the inventory of blood products. Each MTF sent the 226th BSU a daily report indicating the quantities of blood products that were on hand, used, and expired. These reports were sent by Internet to the BSU, where they were compiled and sent to the JBPO using a secure Internet system.

The BSU relied on the Internet and telephone to communicate with its customers and the blood transshipment center. Communications were adequate during most operations. However, sometimes an installation or forward operating base shut down Internet communications for security reasons. When this happened, telephones became the primary means of communicating. At other times, the Internet service went down because of technical problems with the service provider. Fortunately, the BSU had access to multiple telephone systems, such as Army and Air Force phone networks and an Iridium satellite phone, so that it could place orders when the Internet was down. Disposition and transfusion reports were sent as soon as the Internet came back on line.

Blood Product Disposition

It was extremely important to track every unit of blood product that moved through the blood supply system. The daily blood report contained disposition information as well as information on blood products on hand. Disposition information had complete data on expired and transfused units, including information on the patients receiving the transfused units. (Expired blood products were incinerated on location.) JBPO maintained archives of all blood reports for future research.

The BSU used the Theater Defense Blood Standard System (TDBSS) to track which MTF received each blood product. Although it was helpful in managing the overall flow of products, the TDBSS was not helpful in tracking final disposition information because supported MTFs did not use it.

The 226th BSU distributed over 20,000 blood products (2,500 gallons of blood) throughout the Iraq area of operations during OIF II. In the end, the driving enablers of success were the Soldiers, Sailors, and Airmen who made the system work despite the austere environmental conditions, limited access to transportation, short shelf life of blood products, and sporadic communications capability. **ALOG**

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Transforming Special Operations Logistics

BY MAJOR RONALD R. RAGIN

The logistics support structure for Army Special Operations Forces is changing. But ARSOF logisticians can learn valuable lessons from the experiences and practices of their old organization—the 528th Special Operations Support Battalion.

On 11 April 2005, Lieutenant General Philip R. Kensinger, Jr., Commanding General of the Army Special Operations Command at Fort Bragg, North Carolina, approved the Army Special Operations Forces (ARSOF) Logistics Transformation Concept. The concept calls for the creation of five regionally aligned Special Forces group support battalions, three Ranger battalion support companies, and a Special Operations sustainment brigade to replace the 528th Special Operations Support Battalion (Airborne). As the planning for implementing this transformation began, an important requirement became clear: the need to share the lessons learned and the training programs and unique capabilities developed by the 528th Special Operations Support Battalion (SOSB) over its 18 years of providing unparalleled combat service support (CSS) and combat health support (CHS) to Army and joint SOF throughout the world.

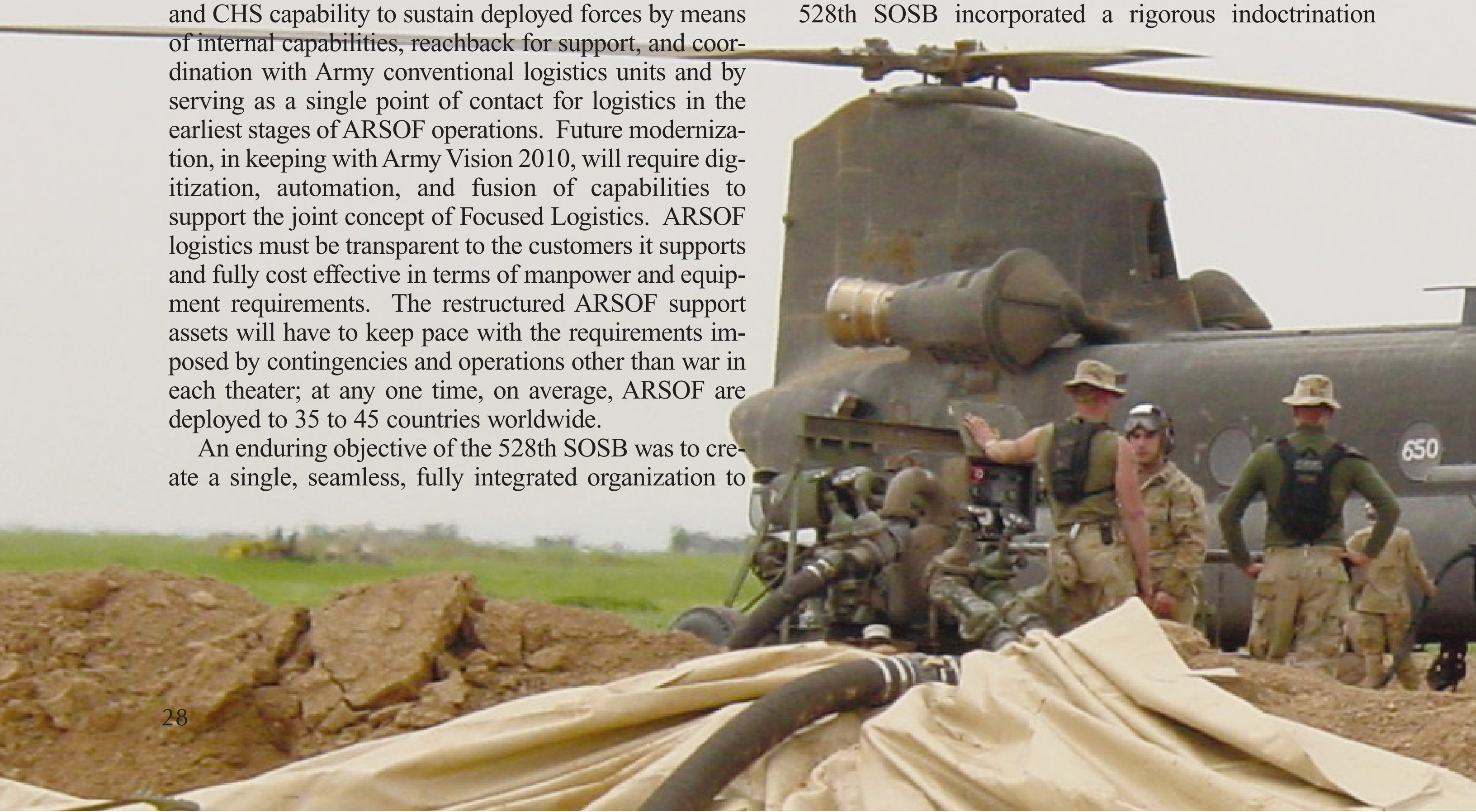
The nature of ARSOF operations places independent forces in remote locations without the logistics structure that normally supports conventional forces. ARSOF transformation is designed to provide an organic CSS and CHS capability to sustain deployed forces by means of internal capabilities, reachback for support, and coordination with Army conventional logistics units and by serving as a single point of contact for logistics in the earliest stages of ARSOF operations. Future modernization, in keeping with Army Vision 2010, will require digitization, automation, and fusion of capabilities to support the joint concept of Focused Logistics. ARSOF logistics must be transparent to the customers it supports and fully cost effective in terms of manpower and equipment requirements. The restructured ARSOF support assets will have to keep pace with the requirements imposed by contingencies and operations other than war in each theater; at any one time, on average, ARSOF are deployed to 35 to 45 countries worldwide.

An enduring objective of the 528th SOSB was to create a single, seamless, fully integrated organization to provide SOF-unique CSS and CHS for deployed ARSOF across the spectrum of conflict, anywhere in the world, from bare-base to urban environments. To achieve this objective, the battalion focused on four fundamental missions: Soldier development, SOF-unique equipping, operational planning and synchronization, and dynamic execution.

Soldier Development

In codifying and building a Soldier development program based on training successes implemented over 18 years, developers focused on answering two important questions: What is a SOF support Soldier? What makes SOF Soldiers special? The answers are firmly embedded in the SOF truths: Humans are more important than hardware; quality is more important than quantity; SOF cannot be mass produced; and competent SOF cannot be created after emergencies occur.

These SOF truths must apply equally to the support Soldiers in order to develop the capabilities needed to sustain SOF operations throughout the SOF battlespace. The three-phased Soldier development program of the 528th SOSB incorporated a rigorous indoctrination



phase, a multiskilled Soldier phase, and a "green cycle" training phase.

Phase 1. During the 3-day indoctrination phase, incoming Soldiers were screened and integrated into the battalion by indoctrinating them with the spirit of the Warrior Ethos mentality: Every soldier a rifleman first. Embedded in a culture where every CSS soldier maintained an individual conviction to achieve his personal best every day, the 528th SOSB paratroopers garnered a reputation as a Super Bowl-caliber team of teams to which every new Soldier wanted to belong. The remainder of the indoctrination phase included learning about ARSOF structure and advanced weapons, combatives [hand-to-hand combat, martial arts techniques taught to SOF Soldiers], obstacle course, land navigation, physical, and common task training.

Phase 2. This phase was designed to ensure that each Soldier was cross-trained in a variety of skills under a concept known as the Multi-Skilled Soldier Concept. This training consisted of four modules: military occupational specialty (MOS) mastery; MOS cross-training; Special Operations first responder (SOFR) training; and equipment operator cross-training.

All Soldiers had to be experts in their own MOSs; this required additional training and, in many cases, additional schooling. For example, mechanics had to attend schools to attain the skills required to maintain nonstandard vehicles and equipment, such as Toyota Tacomas, Mercedes, BMWs, and Polaris all-terrain vehicles.

The MOS cross-training module consisted of three, focused submodules (Super 92, Super 63, and Super 88). For example, the Super 92 submodule cross-trained fuel, water, supply, and ammunition specialists with the intent of creating an SOF logistician capable of operating in a fluid SOF environment and serving as a true combat multiplier under a reduced logistics footprint. (See the chart on page 30.) Each module combined the individual training a soldier had gained through his advanced individual training program and his experiences during previous assignments with unit cross-training; this cross-training was based on SOF-unique collective training and on the requirements and training times found in Soldier training publications. Soldiers were validated and certified by means of rigorous situational training exercises, field validation exercises, and operational deployments.

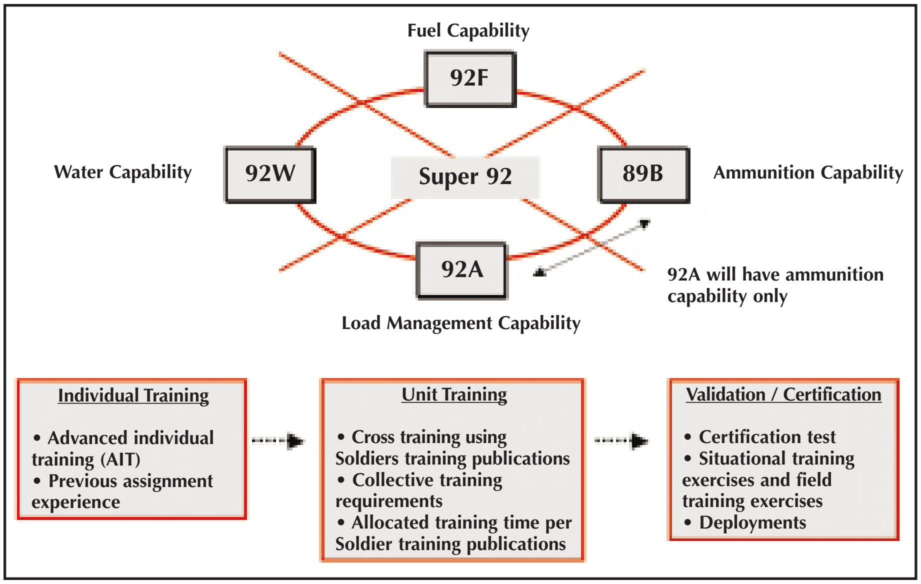
The SOFR module was a 3-day course conducted under battlefield conditions. It was designed to provide nonmedical Soldiers with the skills required to identify and treat life-threatening injuries, such as hemorrhages and respiratory distress. The course also emphasized battlefield evacuation using SOF-specific platforms and preventive medicine.

The fourth module focused on equipment operator cross-training, regardless of specialty. Soldiers were required to maintain qualifications on multiple pieces of equipment, including forklifts, trucks, fuel and water equipment, and generators. The goal was to have Soldiers licensed on all platoon equipment in order to ensure unit flexibility and depth. Leaders were required to maintain documentation on each Soldier's progress through the program.

Phase 3. The final phase of the Soldier development program was a 3-month training cycle, called the "green cycle." While the company was in green-cycle training, it was protected from all garrison and operational requirements so that it could focus on mission-essential task list (METL)-based training. As part of the green-cycle program, each company was required to complete individual training, platoon and company collective training, advanced weapons training, convoy live-fire training, improvised explosive device (IED) training, a company external evaluation exercise (called "Black Dagger Strike"), and an operational readiness survey. The battalion standardized equipment and aligned as many collective training events (such as multilaterals, bilaterals, Gunsmokes, and Joint Readiness

Soldiers of the 528th Special Operations Support Battalion (Airborne) refuel an MH–47 Chinook helicopter of the 160th Special Operations Aviation Regiment at a forward operating base in Afghanistan.

Multi-Skilled Soldier Concept



Phase 2 of the 528th Special Operations Support Battalion's Soldier development program includes military occupational specialty (MOS) cross-training under a concept known as the Multi-Skilled Soldier Concept. The cross-training module includes three submodules, one of which (Super 92) is depicted at left. The Super 92 submodule cross-trains fuel, water, supply, and ammunition specialists to create an SOF logistician capable of operating in a fluid SOF environment.

Training Center and National Training Center rotations) as possible with supported ARSOF units before beginning a mission cycle or deployment. ["Multilaterals" are combined arms joint (and sometimes multinational) live-fire exercises, usually conducted with SOF ground and aviation elements and Navy and Air Force aviation platforms. "Bilaterals" are combined arms exercises, usually with ARSOF ground and aviation assets. "Gunsmokes" are live-fire exercises conducted with ARSOF aviation assets.]

SOF-Unique Equipping

ARSOF logistics units must remain uniquely equipped to sustain current and future SOF operations. Since the beginning of Operations Iraqi Freedom and Enduring Freedom, one-third of the 528th SOSB has been deployed to support SOF operations worldwide while the other two-thirds have been training or refitting for deployment. Because of the operational sensitivity of its multiple deployment locations, the battalion had to develop a means to command and control and securely communicate with forward-deployed elements.

Deployed SOF units conducted weekly command or operational video teleconferences (VTCs) with continental United States (CONUS)-based elements to ensure continuity and synchronization of combat operations. These VTCs were followed by a logistics VTC to communicate and synchronize time-sensitive changes and critical logistics issues and conduct backbriefs. The weekly meetings enabled the 528th SOSB's Support Operations (SPO) Section to successfully synchronize logistics support with SOF operations and bridge gaps between the requirements of deployed units and CONUS-based capabilities.

The battalion maximized the use of commercial off-the-shelf (COTS) technologies to design and build a state-of-the-art mission support center at Fort Bragg. This center enabled the commander to better communicate with and command and control split-based logistics operations and rapidly reinforce forward-deployed logistics assets. To communicate with assets deployed to remote or bare-base locations with limited communications infrastructure, the battalion began the process to acquire SOF Deployable Node Lite (SDN Lite) communications systems. These compact, high-tech communications systems would enable the battalion to establish ubiquitous connectivity rapidly; transfer secure, high-speed data; and establish voice and video reachback capabilities from remote operating bases to ensure continuity of support to deployed SOF elements.

When a theater matures and incorporates conventional forces, or when ARSOF are integrated into a conventional force footprint, SOF logistics must interface with conventional Army logistics support to maximize efficiency, reduce the logistics footprint, ensure connectivity, and provide SOF-unique support. This requires ARSOF logisticians to synchronize their operations with updated CSS capabilities and initiatives so they can leverage new technologies and information systems.

New technologies such as the Battle Command Sustainment Support System (BCS3) will greatly improve ARSOF logistics capabilities. By fusing data from existing systems, such as the Standard Army Management Information Systems (STAMIS), in-transit visibility (ITV), Joint Deployment Logistics Model (JDLM), Integrated Logistics Analysis Program (ILAP), Global Command and Control System-Army (GCCS–A), and medical information systems, BCS3 will enable support assets to develop a logistics common operating picture. BCS3 also will allow ARSOF logisticians to securely manage critical CSS information, such as movement data, theater logistics data, running consumption data, collaborative logistics tools, and military decisionmaking process products.

SOF-unique CSS systems developed or acquired through the years include airdroppable 250-gallon-per-minute fuel pump systems; all-terrain vehicle

(ATV)-mounted TECWAR (Tactical Environmental Components—Water Asset Recovery) Pro 3000 portable reverse osmosis water purification (ROWPU) systems; lightweight manpack-portable or ground-mounted LS3 ultraviolet ROWPU systems; lightweight digital x-ray machines; 5.4-pound handheld ultrasound machines; and a state-of-the-art critical care patient-hold section. ["Manpack" is an individual, lightweight communications system. The "patient-hold section" is a rapidly deployable module with a 10-bed holding capacity and a 4-bed critical care section. It provides a unique capability that typically is not found anywhere in the Army except in much larger organizations such as a combat support hospital.]

Other 528th SOSB equipment includes the Special Operations individual aid bag and the NASCAR rapid tire-pumping system. The battalion's investment in COTS logistics technologies and equipment innovations facilitates operational planning, synchronization, and execution and is paying enormous dividends in sustaining current ARSOF operations in support of the Global War on Terrorism.

Operational Planning and Synchronization

Effective staff planning for logistics support of ARSOF operations requires an aggressive and efficient battle staff. Logistics planning must be done in tandem with the staff of the supported unit through development of orders, review of historical records, and creation of after-action reports. Anticipating mission requirements that will shape the battle favorably for deployed ARSOF elements is not enough. Immediate follow-up actions to verify and validate identified requirements are essential to success.

ARSOF logistics elements should conduct mission analyses at every level and develop a logistics support plan that is fully integrated into the combined/joint Special Operations task force J–4's or regiment S–4's overall logistics plan. The SOF planner should know the operation plan and scheme of maneuver for supported ARSOF units; equipment systems; standing operating procedures; tactics, techniques, and procedures; and the geopolitical sensitivities of the region. ARSOF logistics planning conferences with the staffs of supported units, predeployment site surveys, daily communication of significant activities, and battle update reports are keys to developing a solid logistics plan.

Before conducting a routine replacement of forces in support of ARSOF operations in Afghanistan and Iraq, the 528th SOSB SPO Section conducted a planning conference with the 75th Ranger Regiment, 160th Special Operations Aviation Regiment, and Special Operations Support Command to validate mission requirements against capabilities and develop a detailed concept of support plan using all available data. The plan highlighted the locations of conventional logistics units, theater pipelines, and contractors; available capabilities; and CONUS and theater point-of-contact listings. The plan was briefed to ARSOF commanders for approval before it was executed. The collected research data were used throughout the deployment, and the knowledge of units, locations, and major CSS hubs proved invaluable. The battalion's planners were able to synchronize events, times, personnel, and equipment to set the conditions for optimal CSS force positioning and execution in support of SOF operations.

To augment ARSOF assets in Afghanistan, the 528th SOSB SPO planners maximized the use of the extensive logistics network established at Bagram Airfield and staffed by the Joint Logistics Command (JLC). Historically, ARSOF units have not exploited the capabilities of conventional logistics assets because of security and training concerns or a lack of understanding of what other units can provide to ARSOF. However, the SPO planners recognized an array of possibilities when conducting predeployment site surveys and mission analysis. The JLC deployed a tremendous transportation capability, which enhanced the ability of ARSOF elements to move all classes of supply (except class V [ammunition] and sensitive items) to forward locations.

The 3d Special Forces Group's service detachments coordinated with the JLC to include their forward operations bases (FOBs) and advanced operations bases in the JLC's maintenance support team (MST) rotations. The MSTs diagnosed non-SOF-specific equipment in forward locations and sent parts requests back to the FOB at Bagram Airfield to be ordered through the FOB's Unit Level Logistics System-Ground computer. The conventional MSTs were augmented by SOF logistics assets to provide SOF-specific support. Planners learned to minimize the requirements of deployed ARSOF by synchronizing the concept of support plan with supported ARSOF units and already-deployed conventional logistics assets, thus obtaining support on an area support basis.

It is essential that ARSOF logisticians be firmly grounded in conventional Army logistics systems and procedures in order to guarantee minimum adverse impacts on dynamic ARSOF operations. ARSOF task forces normally consist of joint and combined forces along with other Government agencies. Elements can range from civilian contractors to other SOF organizations with direct action missions, some of which will have specific mission requirements for specialized items. The independent nature of ARSOF units and their general unfamiliarity with the logistics system have required detailed coordination and dynamic execution to alleviate support concerns.

Dynamic Execution

ARSOF, by design, are versatile and resourceful—qualities that enable them to set the time, place, and manner of achieving victory. Their specialized ability to adapt and adjust to changes in a dynamic environment guarantees a high probability of mission success. The ARSOF logistics system must provide a similar level of flexibility to the execution of the logistics support plan.

The 528th SOSB recognized that an essential element for adding flexibility was centralization of logistics operations under one deployed command node for elements deployed in the U.S. Central Command area of operations (AOR). This provided a forward central command and planning presence that had the authority to rapidly shift logistics assets across traditional SOF boundaries in response to the changing dynamics of operation plans. On several occasions, assets dedicated to support Special Forces units were shifted to assist Ranger operations and assets dedicated to the Rangers were shifted to support operations of the 160th Special Operations Aviation Regiment. The ability to coordinate the movement of high-demand assets between mission sets provided required flexibility, maximized the use of personnel with low-density MOSs, and reduced the overall logistics footprint.

Unforecasted changes in SOF operational requirements in both Afghanistan and Iraq required deployed logistics Soldiers to maintain a high degree of flexibility. Junior enlisted Soldiers performed as sergeants, and sergeants performed in roles traditionally filled by junior officers. At times, cooks acted as supply specialists, water specialists conducted aviation hot-refuels, riggers worked as movement specialists, and mechanics fixed nonstandard vehicles. Planners shouldered duties of contractors and base defense coordinators, and all performed their part as vital enablers in the successful execution of the SOF operation plans.

The trained, multiskilled Soldiers of the 528th SOSB were tremendous combat multipliers for ARSOF elements operating from remote bases with limited access to supplies and services. In particular, they provided trained mechanics for nonstandard vehicles, engineers, and supply specialists. As ARSOF mission requirements expanded, the battalion's Soldiers were responsible for rapid coordination of receipt, storage, and issue of all classes of supply; engineer heavy-equipment operations; base support functions such as billeting, power generation, and airfield and motor pool parking space management; reception, staging, onward movement, and integration (RSO&I); and land management. ["Land management" is the process of allocating space and land to units occupying a certain geographical area.] If operational requirements exceeded the logistics capabilities of deployed SOF, the SPO cell forward, in conjunction with the special operations theater support element, coordinated across the AOR to find SOF-specific or conventional assets to meet the validated operational requirement before submitting a Request for Forces for CONUS-based assets.

By operating globally in "the seams" between peace and war, SOF will remain our Nation's instrument of choice to find, fix, and finish any emerging threats. An essential combat multiplier for sustaining this lethal strike capability is maintaining a fully integrated and synchronized SOF-unique logistics base that is capable of providing staying power, rapid force projection, early entry, versatility, flexibility, and responsiveness to supported SOF units.

As we move into the future, the lessons learned by the 528th SOSB and the training programs and unique capabilities it developed over 18 years of providing unparalleled CSS and CHS to all Army and joint SOF must not be lost. To guarantee expert SOF support, all newly designed ARSOF logistics organizations should remain firmly rooted in the tenets of Soldier development, SOF-unique equipping, operational planning and synchronization, and dynamic execution. **ALOG**

At a SOF forward operating base in Afghanistan, 528th SOSB Soldiers conduct advanced weapons familiarization training with task force Rangers.

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Controlling Contract Costs in the Balkans

BY THERESA DAVIS

U.S. Army Europe has increased its reliance on contractors for logistics support in the Balkans while reducing its costs.

A leaner military force means increased reliance on contracted logistics support, and greater use of contractors inevitably leads to out-of-control costs. Right? Not necessarily. Whether keeping the peace in the Balkans or, more recently, fighting terrorists in Afghanistan and Iraq, today's streamlined forces increasingly depend on contracted logistics support. However, that support requires careful stewardship of resources, particularly since contractor services and their costs are subject to intense scrutiny by Congress.

U.S. Army Europe (USAREUR) has employed contractor support in the Balkans since the United States began operations there in 1995. In the intervening decade, USAREUR's leaders have taken significant steps to ensure proper stewardship of limited resources. Even with these efforts, the Government Accountability Office (GAO) reported in September 2000 that the Army needed to do more to control Balkans contract costs. That report identified several shortcomings, ranging from allowing the contractor to maintain 100 percent redundancy of power-generation capabilities (when only critical operations, such as the command center and the hospital, required uninterrupted power) to allowing the contractor to maintain an overly large workforce of local nationals. USAREUR took immediate action in response to that GAO report. By the time GAO issued a second report in June 2003, it was able to report, "USAREUR's efforts should be a benchmark for other major contracts."

Two Kosovars replace brakes on an M978 heavy, expanded-mobility, tactical truck. Local nationals work with the Kosovo Force to keep vehicles and equipment operational.

How did USAREUR improve contract oversight and get contract costs under control? The answers to that question may serve as lessons learned for other commands and organizations faced with increased reliance on contracted logistics support.

The Players and the Contract

In December 1995, U.S. troops deployed to Bosnia as part of a multilateral coalition under North Atlantic Treaty Organization (NATO) command to help implement the Dayton Peace Accords. In June 1999, the United States began providing additional troops for the NATO-led Kosovo Force to assist with peace enforcement in Kosovo.

Headquarters USAREUR was—and still is—responsible for supporting troops deployed to the Balkans. The command turned to a contractor to house, feed, and provide services to the Bosnia and Kosovo task forces. USAREUR chose the Army Corps of Engineers Transatlantic Program Center (CETAC) to award the contract. The current Balkans support contract was awarded competitively to Halliburton KBR in February 1999 and became effective that May.

CETAC is responsible for administering the contract on behalf of USAREUR. The Defense Contract

Management Agency (DCMA) and the Defense Contract Audit Agency (DCAA) support CETAC with contract administration and oversight. The CETAC principal contracting officer assigns contract administration functions to DCMA as delineated in a "delegation matrix." Under this delegation, DCMA provides quality assurance specialists, property administrators, and contract specialists to monitor the performance and costs of services incurred under the contract. DCAA validates the accuracy and completeness of the contractor's cost accounting system and performs audits of incurred costs. For its services, CETAC charges USAREUR a percentage of the ongoing contract cost; DCMA and DCAA charge no fee for their services.

While CETAC and DCMA play large roles in contract award and administration, they do not have ultimate responsibility for resource management and operational cost control. CETAC and DCMA ensure contractor quality performance and adherence to the terms of the contract. Through contracting actions, they administer theater-defined mission support functions included under the Balkans support contract.

Once USAREUR and the Bosnia and Kosovo task forces have determined their operational requirements and required support services, CETAC and DCMA ensure that those requirements and services are covered in the contract. Operational planning is not the job of CETAC and DCMA. However, requirements and planning are essential elements of controlling contract costs. In terms of managing costs under the contract, the main players are the consumers of the services (the task forces), the provider of the services (KBR), and the bill payer (USAREUR).

The Impetus to Reduce Costs

Because the cost of Balkan operations comes out of USAREUR's contingency operations (CONOPS) funding, USAREUR has a clear incentive to reduce costs. This was not always the case. Initially, USAREUR focused on supporting the mission—getting essential services in place to support Soldiers in a hostile environment. As the situation in the Balkans stabilized, however, the focus began to shift to controlling costs.

In 2001, money for the Balkans was integrated into USAREUR's CONOPS funding, and USAREUR's level of interest in Balkans spending became even more acute. The emphasis on reducing contract costs not only was driven by limited resources but also was directed from the top. The Deputy Commanding General of USAREUR emphasized the importance of controlling costs and assigned responsibility for contract accountability to the G–4 (Logistics) section on the USAREUR staff.

Since most of the ongoing contract costs were for recurring services, the agency responsible for ongoing logistics support—the USAREUR G–4—was an appropriate choice. While he delegated cost-control responsibility, the USAREUR Deputy Commanding General maintained his involvement and oversight throughout the process.

Three-Pronged Approach to Reducing Costs

Because the task force commanders in Bosnia and Kosovo are the main consumers of contract services, KBR provides those services, and the USAREUR G–4 pays the bills and oversees contract support, all three main players have to engage in and support the effort in order to reduce costs.

The three groups initially had divergent interests. The task forces and other supported personnel are stationed in the Balkans for 1 year (formerly only 6 months) at a time and have a relatively short-term view of the operation. They naturally wish to obtain the best quality of life they can in a harsh environment. However, commanders often were not aware of the cost ramifications of their decisions. Extended dining facility hours, less crowded quarters, and faster laundry service are all desirable—especially when someone else is paying the bill.

Initially, KBR determined the quality and level of services to be provided under the contract and negotiated these services directly with the task forces. As a for-profit company, KBR was willing to provide any increased services the consumer was willing to pay for. The increased services meant increased estimates at completion and, potentially, larger base fees and award fees paid to the contractor.

The challenge for USAREUR was to motivate the task forces and the contractor to help control costs. USAREUR's approach was three-pronged: provide a financial incentive for the contractor to reduce costs; set service-level expectations for the task forces and give them a budget; and take a hard look at the contract and USAREUR's own internal procedures.

Motivating the Contractor

How did USAREUR motivate the contractor to control costs? The Balkans contract is cost-reimbursable and performance-based and gives the contractor considerable flexibility in determining how best to provide the requested services. The contract sets two categories of tasks: recurring services and new work. Any activity performed on a continuing basis, such as food service, is defined as "recurring services" and requires no further approval once initiated. Any task not previously authorized or that is termed a one-time service, such as constructing a base camp, is referred to as "new work."

Under the contract, the Army reimburses KBR for costs incurred. KBR makes a profit from a base fee of 1 percent of the estimated cost of the work performed and an award fee of up to 8 percent of the estimated cost of the work performed. The estimated cost of the work performed is agreed to by the Government and KBR, based on the estimated cost of recurring services for the year plus the estimated cost of new work begun during the year.

Eight percent of this aggregate of estimated costs is commonly referred to as the award fee pool. The award fee board, which meets three times a year, reviews the contractor's performance for the most recently completed award fee period and recommends an award fee percentage to the award fee determining official. That official determines and announces the award fee percentage to be awarded for the last completed 4-month award fee period.

The contractor's performance is rated in three areas: cost control and financial management; performance; and coordination, flexibility, and responsiveness. The G–4 tied a portion of the award fee determination to cost reductions and required the contractor to demonstrate real cost savings to merit the highest rating. Excellent performance under the contract then was capped at 95 percent of the award fee pool. The contractor had to demonstrate new savings or improvements to receive the remaining 5 percent of the award fee pool and the corresponding rating of "outstanding." USAREUR also made cost control the highest-weighted element in contractor evaluations, increasing its weighting from 30 percent to 40 percent. To compensate, the weighting given to both performance and flexibility was reduced from 35 percent to 30 percent.

Before these changes took effect in October 2001, KBR had been receiving an average award fee of 98.5 percent of the available pool. After USAREUR implemented cost-control weightings, the percentage dipped to 95 percent. It fell still further, until the contractor understood the seriousness of the Army's intent. It was not until May 2003 that KBR received an award fee of more than 95 percent, and that was 95.5 percent.

With its award fee now partially contingent on reducing costs, KBR began identifying opportunities for savings. For example, the contractor instituted a training program that converted positions from expatriate (Americans living outside the United States) positions to host-country national positions and reduced the number of overtime hours worked. In fiscal year 2003 alone, this saved USAREUR $33.8 million in contractor labor costs.

Motivating the Consumers

How did USAREUR get U.S. military units deployed to the Balkans to help in reducing costs? Since KBR formerly had determined the quality and level of services provided under the contract, the USAREUR staff, in conjunction with Balkans military personnel, developed and enforced contingency quality-of-life standards to help in containing the cost of those services.

USAREUR developed Red, Blue and Green Books to set respective service-level standards for facilities, base camp operations, and resource management in contractor-provided services as diverse as ammunition supply, transportation, laundry, power generation, and space allocations for living quarters. All USAREUR staff elements, along with supported personnel, contributed to the books, which now set the level of expectation for services provided in the Balkans and give clear guidance to the contractor on services authorized. These contingency service standards are reviewed periodically.

It also is imperative that the task forces be given a contracting budget for the year—the earlier in the operation, the better. This ensures that commanders understand how their actions drive costs and affect overall resource stewardship. Any additional services they request, whether purchased from KBR or from other contractors, are charged to this budget.

USAREUR then decided to examine the request guidelines. An existing joint acquisition review board reviewed contracting actions paid for by either USAREUR or a task force. The board also lowered dollar thresholds for approval. Originally, contracting actions under $100,000 could be approved by the task force, while USAREUR staff elements could approve expenditures under $500,000. Actions exceeding those amounts required review by the USAREUR Deputy Commanding General. The review board lowered these dollar thresholds to $50,000 and $200,000 respectively, giving USAREUR better visibility of Balkans purchases. A review of the standards, now underway, is expected to reduce those dollar amounts even further.

Along with lowering dollar thresholds, USAREUR now requires preparation of independent Government estimates on requests exceeding the thresholds. This requirement helps reinforce discipline in cost measurement.

Doing a Better Job Internally

USAREUR also carefully examined how it was doing business under the Balkans support contract and set out to improve its internal actions. Early on, the USAREUR G–4 had only one civilian working part-time to oversee the contract. However, it was soon realized that more logistics support requirements increased contract costs and created a critical need for more contract oversight manpower. So the G–4 office hired a Balkans program manager with contracting

A Kosovar relocates a container at Camp Bondsteel, Kosovo. The containers are used to store Army supplies and equipment and are consolidated to improve access.

expertise and engaged four program analysts to form a contract management cell.

These hiring actions provided a group of dedicated staff members to manage the contract. This team is largely responsible for supporting and implementing cost-control actions. The G–4 also added an on-site CETAC liaison, and later an on-site KBR liaison, to help with planning.

This contract management cell improved the G–4's visibility over contractor actions in the areas of subcontracting, incidental construction and services, and property purchases. The cell issued technical directions that required the contractor to obtain consent from DCMA for subcontracting costs over $100,000. For added visibility of temporary construction incidental to providing services, the cell developed a process that required the contractor to provide prior notice and obtain approval for all work estimated to cost over $25,000. This procedure allows for systematic review and improved Government visibility.

Government consent for property purchases was enhanced by a modification requiring the contractor to provide written notification for any purchase greater than $5,000 and increasing the notification time from 5 to 10 days. This gave USAREUR greater visibility of and control over items that the contractor was purchasing to support operations and over incidental construction efforts. USAREUR began reviewing bills with increased knowledge of what was happening on the ground and found items such as unrealistically high hotel room costs for truck drivers and numbers of hotel bills exceeding the numbers of drivers. All discrepancies were corrected.

USAREUR also fully recognizes the importance of an outside look at how it does business and often has relied extensively on organizations such as the Army Audit Agency and USAREUR's Internal Review and Compliance Office to review various aspects of the operation. GAO's role also cannot be underestimated. Regular GAO visits and follow-on audit recommendations provided momentum to efforts to control costs and independent monitoring that helped USAREUR judge the success of its efforts.

As stated earlier, KBR earns a base profit of 1 percent of the negotiated estimated cost of work performed and an award fee of up to 8 percent of that amount. The negotiated estimated cost is the basis for both the base fee and the award fee pool and directly affects the amount of money the contractor can earn. If the negotiated estimated cost is inflated, the Government pays more than necessary; if it is understated, the contractor receives less compensation than merited.

The originally negotiated estimated cost was set before major downsizing in the Balkans and did not take into account USAREUR-directed operational changes that subsequently reduced actual costs. USAREUR worked with CETAC to review the estimate at the completion of the award period and, as a result, renegotiated with the contractor. The estimated cost of the work performed for fiscal years 2003 and 2004 was revised from approximately $578 million to approximately $419 million, thus reducing the base

and award fee pools for this period by approximately $13 million.

USAREUR also added more representatives to the award fee board, which originally was composed of CETAC, DCMA, and USAREUR personnel. The number of CETAC voting members was reduced and the USAREUR G–8 (Comptroller) and G–1 (Personnel) were added to the USAREUR personnel already on the board (the USAREUR G–4 and Deputy Chief of Staff for Engineering).

USAREUR instituted partnering sessions with the contractor and a Senior Management Council. These meetings are set to coincide with meetings of the award fee board and further improve communications among KBR, CETAC, and USAREUR. The meetings also involve the contractor in the contingency planning process.

Finally, adding an on-site KBR liaison within the G–4 has provided valuable feedback and allowed USAREUR to make more cost-effective operational decisions.

Aligning Mission, Troops, and Contract

While USAREUR was reducing contract costs, operational requirements also were changing. From May 1999 to December 2003, the number of troops in the Balkans was reduced by 70 percent. One would assume that reducing troops would help to reduce costs, but the decline in troop strength did not lead to an equivalent reduction in costs.

As troop levels declined, functions that had previously been performed by Soldiers shifted to the contractor. The contract originally included such services as base camp operations and maintenance, food service, laundry, equipment maintenance, road maintenance, transportation, and environmental services. As troops performing other missions left, KBR took on those duties, including firefighting, airfield crash and rescue, snow and ice removal, vehicle maintenance, and supply support activity operation.

The overall reduction in troop strength and deployments created a need to reduce the number and geographical spread of facilities and consolidate personnel and services. Each facility's closure and dismantling was new work, which increased the cost of the contract. However, constant synchronization of contract operations with mission requirements saved money in the long run.

Even though USAREUR asked the contractor to provide more services, consolidate personnel, and deconstruct camps and facilities, it was able to reduce Balkans contract costs by 63 percent. From fiscal year 1999 to fiscal year 2003, USAREUR CONOPS spending dropped from $2.280 billion to $782 million, while Balkans support costs fell from $579.1 million to $215.8 million. Contract costs remained approximately 25 percent of CONOPS spending in the Balkans during this period, while contracted services steadily increased. This was a significant accomplishment.

What lessons can be learned from the USAREUR experience with contracted logistics support in the Balkans? First and foremost, someone must be responsible for contract management and oversight—in effect, have "ownership" of the contract. Early on, USAREUR's Deputy Commanding General established a clear line of accountability and responsibility for the contract to the USAREUR G–4 while maintaining his own involvement and oversight throughout the process. The Army would not buy a weapon system without a program or project manager to oversee production on an ongoing basis; a service contract also requires continuous Government oversight and management.

Second, change requires adequate resources. The USAREUR G–4 increased its contract administration workforce, originally consisting of one part-time employee, by adding a Balkans program manager and four program analysts.

Third, audit agencies, including GAO, should be considered partners in achieving effective resource stewardship. USAREUR found over the years that GAO really could be a friend; its feedback served as the basis for actions to control contract costs. USAREUR worked to implement GAO findings and used subsequent GAO visits to assess the success of its efforts.

Finally, partnership works. Controlling costs must be a collaborative effort, with all of the stakeholders fully committed to the result. Through the award fee boards, the senior management council, and various process action teams, the USAREUR G–4 began to partner with KBR, the task forces, CETAC, and DCMA.

By jointly setting service standards and by providing a financial incentive for the contractor to control costs, the personnel serving down range and the KBR personnel became partners with the USAREUR staff in achieving cost-reduction goals. All the players worked toward the same end: providing excellent, cost-effective support to our Soldiers deployed to the Balkans. **ALOG**

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MEMS: Micro Systems for Asset Visibility and Monitoring

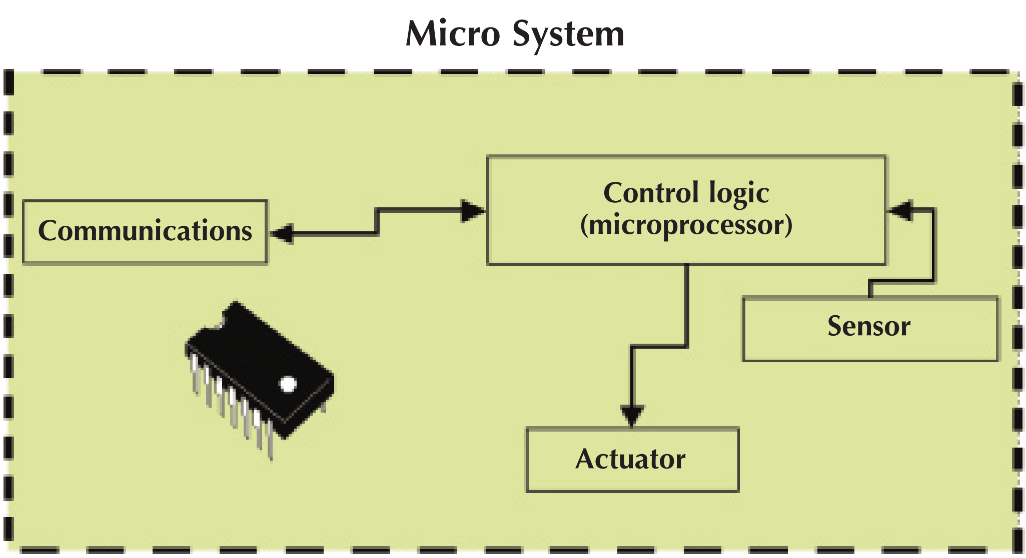
BY JOHN YATES

Micro-electro-mechanical systems may be a key technology to achieving anticipatory logistics support.

The Army must explore and leverage technological innovations to maximize warfighting effectiveness as it transforms from the Current Force to the Future Force and achieves joint and expeditionary capabilities. The Focused Logistics Joint Functional Concept, approved by the Joint Requirements Oversight Council, serves as a framework for achieving these capabilities. A key component of Focused Logistics is the ability to provide rapid response, asset visibility, and improved agility tailored to the sustainment of forces at the strategic, operational, and tactical levels.

Transforming to this new environment will require the fusion of operations, intelligence, and logistics enterprise domains to support rapid and dynamic operations. New technology solutions, integrated systems, and support processes will be needed if logisticians are to effectively transform materiel management, distribution, transportation, and warehousing operations to meet future demands. Future capabilities will require anticipatory logistics support, which can be provided by embedded diagnostic sensors that anticipate failures and initiate resupply or replacement activities to sustain mission readiness.

One promising new technology, micro-electro-mechanical systems (MEMS), has the potential to allow logisticians to begin proactively planning and providing focused logistics support to Soldiers today. Through MEMS, it is possible to envision a day in the not-so-distant future when assets can talk—sensing problems and automatically providing alerts in advance of impending failure, or providing status information on demand on the situation and condition (or "health") of assets. From a logistician's perspective, it would be a considerable leap forward not only to see assets at rest or in motion but also to know the condition of those assets and to have corresponding life-cycle histories that show the factors contributing to the assets' failure in operational settings. MEMS-based sensors, coupled with automatic tracking devices, can help logisticians in "getting smart with logistics."



MEMS technology uses modern fabrication techniques to provide integrated systems capabilities on a "micro" scale. MEMS technology is already in use for military and commercial applications. In the event of airbag deployment in a car, MEMS-based sensors and actuators probably can be thanked for reliably sensing and deploying this life-saving technology.

What are MEMS?

MEMS combine modern electronics technologies with mechanical systems on a very small scale to sense, control, and act on events of interest. In simple terms, MEMS technology is a way of combining computer smarts with sensors to analyze and react to changing situations. As illustrated at left, MEMS technology provides integrated systems capabilities on a truly "micro" scale.

From monitoring the health of assets on and off transportation platforms to improving life-cycle management, securing cargo, or displaying recent enemy movements on a vehicle mapping system, MEMS technology promises to be pervasive in Army Transformation.

MEMS Pilot Test

The Army Logistics Transformation Agency (LTA) is conducting proof-of-concept testing to validate the application of MEMS near-real-time sensor data and controls to logistics business processes. Before initiating proof-of-concept testing, LTA conducted an analysis to identify and test MEMS product capabilities, analyze applicable business processes, and document potential design concepts.

The overall goals of MEMS technology exploration include—

- Capitalizing on advances in MEMS technology to achieve proactive logistics support, improve decisionmaking, and support Army Transformation.
- Providing timely and accurate information to Soldiers and logisticians on the viability of assets by using MEMS integrated sensor data collection, reporting, and asset health monitoring.
- Developing an integrated framework and standard approach for collecting, reporting, controlling, and monitoring asset health within the framework of a common logistics operating environment.
- Improving life-cycle management and asset visibility by combining "sense" capabilities with radio frequency identification (RFID) and other communication technologies.

Individual protective equipment (IPE) was selected as the first pilot test application. The IPE includes Joint Service Lightweight Integrated Suit Technology (JSLIST) suits, gloves, boots, and other gear designed to protect against chemical and biological hazards. Applying MEMS technology to IPE will help quantify the benefits of using integrated MEMS-based sensors within a representative Army logistics management situation.

IPE was chosen as the initial pilot test in order to build on previous work completed by LTA to standardize asset marking and improve asset visibility and control of this critical commodity. Also, since IPE is a shelf-life item and contains both rubberized materials and adhesives, the environment in which a given contract lot is kept can affect selection of valid test samples for surveillance, shelf-life testing and extension decisions, and overall product life-cycle management.

The MEMS pilot recommendation was approved by the Department of the Army Automatic Identification Technology Senior Steering Committee in March 2004. While IPE can be used in desert, arctic, and jungle environments, LTA decided to focus the MEMS IPE pilot test on capturing and determining environmental extremes and alert thresholds for a desert environment. Testing in a desert environment also would help maximize effectiveness of IPE management in current Army operations in Iraq. The MEMS IPE pilot test includes the monitoring of assets in storage at Blue Grass Army Depot, Kentucky, monitoring of assets in transit, monitoring of environmental conditions in a desert environment, and recovery operations at Pine Bluff Arsenal, Arkansas.

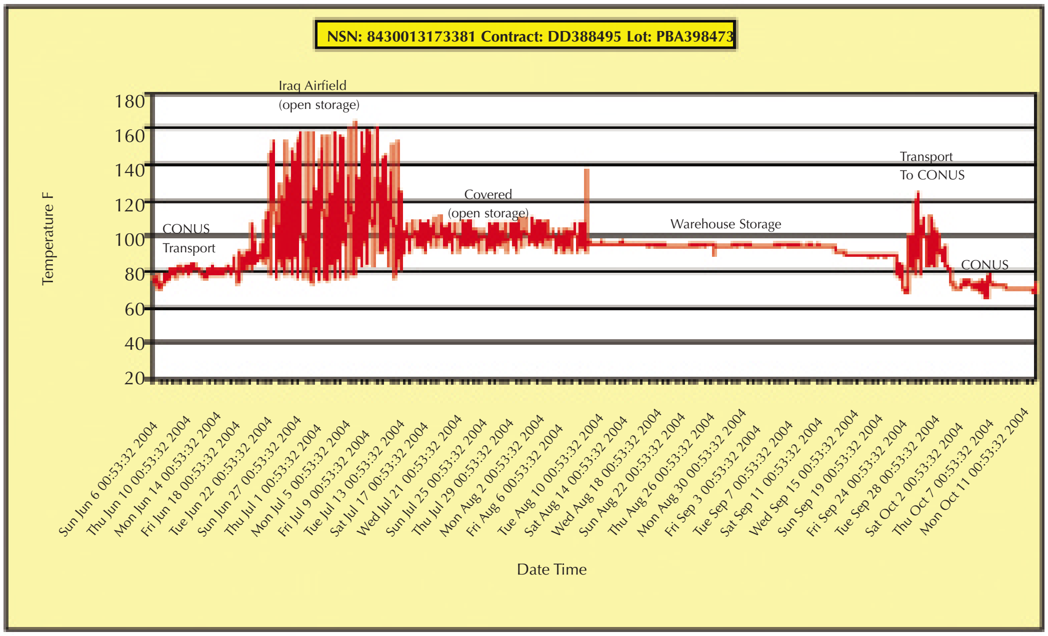
Using Radio Frequency Identification

Management of IPE to support rapid deployment of forces presents many challenges. Individual sizes of chemical gear must be stored, inventoried, sorted, tracked, and issued against established shelf-life criteria and relevant messages that affect the serviceability of a given manufacturing lot. For early-deploying units, two sets of serviceable, basic-load IPE ensembles are stored and managed at the installation level. For later deployers, IPE is managed at the depot level through the Army Chemical Defense Equipment Go-to-War Program. Gaining necessary visibility of IPE assets across the board and synchronizing current and future requirements against the quantity of stock on hand and relevant serviceability data are continuing readiness challenges.

To meet this challenge, MEMS technology has been combined with active RFID devices. Use of MEMS with RFID can help track IPE assets and monitor the shelf-life and environmental factors that affect the execution of surveillance, receipt, recovery, inspection, and life-cycle management processes. MEMS with RFID provide standoff asset visibility, self-reporting communications, and data storage functions capable of measuring, recording, alerting, and providing immediate feedback to Soldiers and logisticians on the viability of assets. While other communication methods or platforms could be used, RFID has the advantage of a sizeable, existing Department of Defense (DOD) infrastructure that allows for the rapid injection of MEMS sensor capabilities with minimal cost.

MEMS, RFID, and the Desert Environment

To quickly populate MEMS RFID tags for shipment to Iraq, standard two-dimensional barcodes located on IPE boxes were read with a Windows-based handheld computer. The same handheld device then was used to write requisite data onto the MEMS tags. This approach is similar to how DOD handles current RFID tags. However, it includes a means of setting up alert-triggering thresholds through the current fixed and mobile readers based on measurements that fall



The MEMS pilot test is using MEMS to determine the condition of IPE in desert environments. This chart shows the temperatures recorded in Iraq in different types of IPE storage from June to October (including return to CONUS).

outside of an acceptable parameter. Unlike current tags, alerts also can be triggered if a shelf-life date is exceeded or is close to being exceeded, depending on the amount of warning desired. As part of the pilot test, over 100 pallets of IPE were tagged with MEMS devices and shipped to Iraq.

Actual MEMS data gathered from those shipments are represented in the chart above. These data provide a histogram of temperatures measured on an hourly basis from June through September 2005 and currently are being used to help determine the effects of a harsh temperature environment on IPE assets. IPE assets were shipped from the continental United States (CONUS) to Iraq, where they were kept in outside open storage and then in outside covered storage before being moved into a climate-controlled warehouse. At the end of September, the associated MEMS devices were returned to CONUS for further analysis. MEMS can provide a powerful tool for management of IPE assets in an adaptive environment.

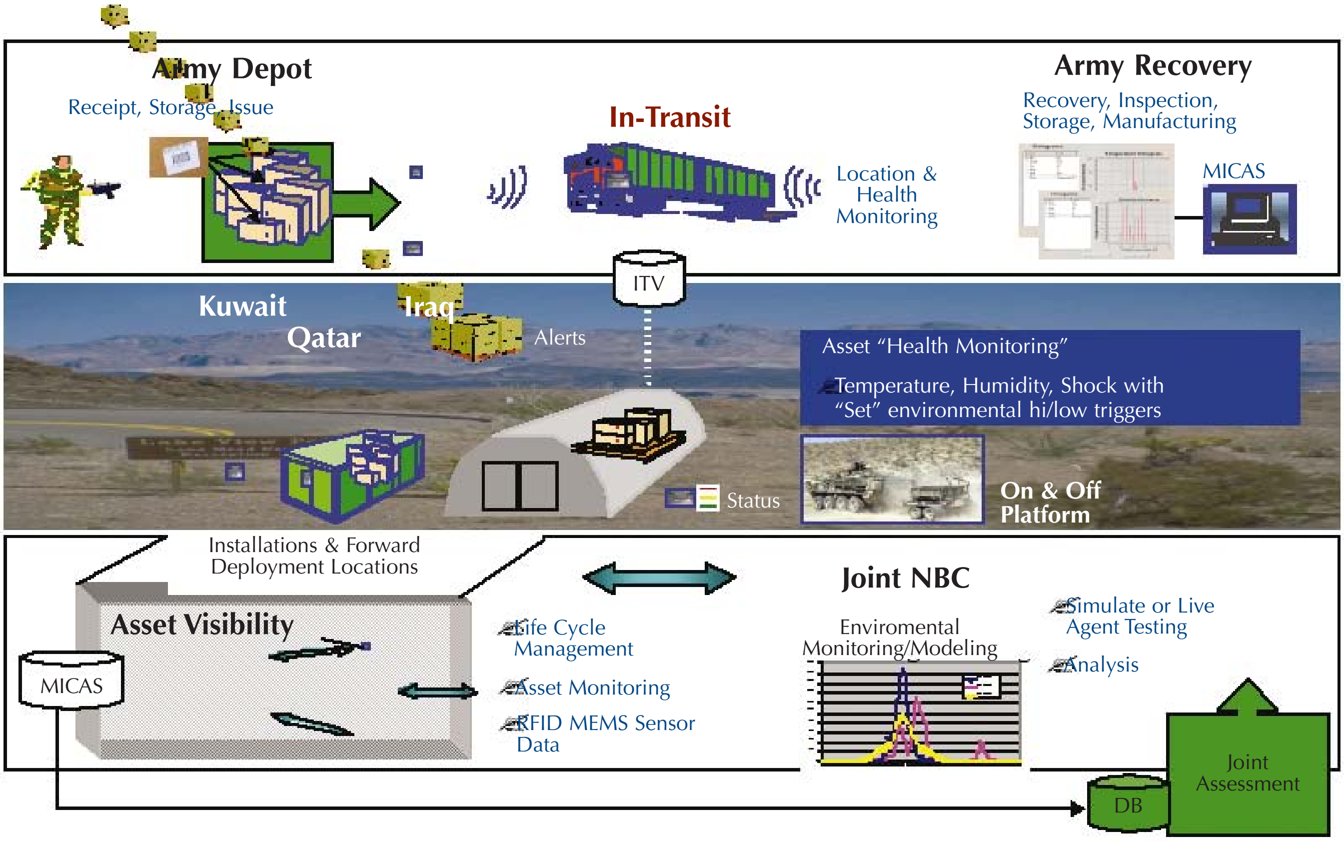
Based on the results of the pilot testing, LTA is working with Army Soldier Systems Center at Natick, Massachusetts, to validate the required trigger threshold for temperature alerts for MEMS devices used specifically for IPE assets. A test plan was developed to mimic environmental conditions observed in Iraq within a controlled laboratory setting. Accelerated aging on IPE test articles, followed by live agent testing, will help determine the effect of a desert environment on the serviceability of IPE. Previously, JSLIST assets were tested to temperatures below what were recorded by MEMS devices in Iraq. As illustrated below, IPE temperature peaks were experienced while the items were in open, uncovered storage. Testing conducted as part of this pilot will provide valuable information on the negative effects of temperature on IPE shelf life, but additional testing will be required by IPE program managers to fully quantify effects within desert, arctic, and jungle climates.

MEMS and In-Transit Visibility

The MEMS IPE proof-of-concept evaluation includes an in-transit visibility (ITV) alert feature to assist logisticians in anticipating failures and initiating resupply or replacement activities before failures occur. Specifically, if a temperature parameter or shelf-life date is exceeded when the MEMS device is read using a handheld reader, an alert will be provided automatically through the DOD ITV server to the Soldier on the ground. The built-in alert feature will allow logisticians to manage assets more proactively by anticipating requirements and engaging necessary support actions when and where they are needed. In addition, MEMS will enable Soldiers to more effectively determine asset viability and suitability for onward shipment and use.

An interface to the Mobility Inventory Control Accountability System (MICAS), currently in development, will improve end-to-end life-cycle management and monitoring of IPE. MICAS is an automatic identification technology-enabled tool used by the Army and Air Force to provide improved IPE asset visibility and inventory control and to automate business processes associated with issue, receipt, storage, inventory, tracking, and shelf-life management. By integrating MEMS with the Army's MICAS IPE shelf-life management tool, the location, quantities, status, and environmental history of IPE can be tracked to improve asset visibility, surveillance, receipt, recovery, inspection, and selection of

MEMS
Individual Protective Equipment (IPE)



MEMS will allow managers and Soldiers on the ground to see the location and movement of assets and monitor their condition.

valid cross samples for shelf-life testing. The MICAS MEMS integration is scheduled for completion in late 2005.

As depicted in the chart above, by applying MEMS technology to IPE, managers and Soldiers on the ground can see the location and condition of assets on hand, the length of time those assets have been at a particular location, and the corresponding environmental data (temperature and humidity) for that location over time. The preliminary results from the MEMS IPE pilot test have been positive.

Once MEMS RFID technology is fully validated, it can be expanded to other assets and integrated with future sense-and-respond logistics capabilities. The initial analysis for applying MEMS to medical supplies is underway; more information on this MEMS application will be available in the near future. Other logistics application areas include perishable subsistence, maintenance diagnostics and prognostics, ammunition, hazardous materials, containerized engine tracking, and component and subcomponent environment "health monitoring."

Moving forward with exploration and experimentation with MEMS technology will provide logisticians a unique opportunity to transform logistics to achieve more timely and proactive Soldier support. As the technology becomes more widespread and is integrated with command and control applications, it will help combatant commanders in gaining near-real-time situational awareness and improving strategic responsiveness with more timely, condition-based information. **ALOG**

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A New Business Strategy for Equipping V Corps

BY MAJOR NOAH HUTCHER

The way the United States equips its forces to fight wars has been evolving since the Army's humble beginnings as a band of citizen soldiers fighting for independence. During World War II, war bonds, Liberty ships, and "Rosie the Riveter" were some of the symbols of the Nation's full commitment to meet the challenges it faced. Every man, woman, and child felt the impact of a nation—and a world—at war. Soldiers and units knew they were in the fight until the war ended. The Korean War was characterized by rapid buildup, break-out success, unexpected turning of the tide, and then stalemate. The Army fought in Korea with units and equipment remaining from the end of World War II. The Nation felt the impact of the war to a lesser extent than it experienced during World War II, but Soldiers and units again knew they were in it for the long haul.

During the Vietnam War, unit and equipment deployment, gradual buildup, and individual Soldier rotations changed the warfighting paradigm. Units and equipment stayed, but Soldiers rotated yearly. Americans knew they were at war, but the primary way they felt it was morally and politically.

With Operation Desert Storm, the United States again changed the way it resourced and fought a war. Long, gradual buildup of equipment and personnel, rapid decisive victory, and rapid withdrawal were the pattern. With the support of the entire world, U.S. forces—built, trained, and equipped to fight the Soviet Union—displayed their muscle against an inferior foe.

The buildup for the Operation Iraqi Freedom (OIF) ground invasion followed the pattern established in Operation Desert Storm. The Army moved forces from the continental United States and Europe to Kuwait. The forces trained and prepared in a safe haven and attacked at a designated time. However, at the conclusion of major ground combat operations, the military found itself facing a growing insurgency, which prevented a rapid drawdown of forces. At the same time, the United States had forces committed to the ongoing Operation Enduring Freedom (OEF) stability assistance mission in Afghanistan. To support both OIF and OEF, the Army deploys units and equipment for 1-year periods. This seemingly simple solution to maintaining forces for a sustained period has actually created a new set of challenges for equipping deploying units.

Equipping Back-to-Back Deployments

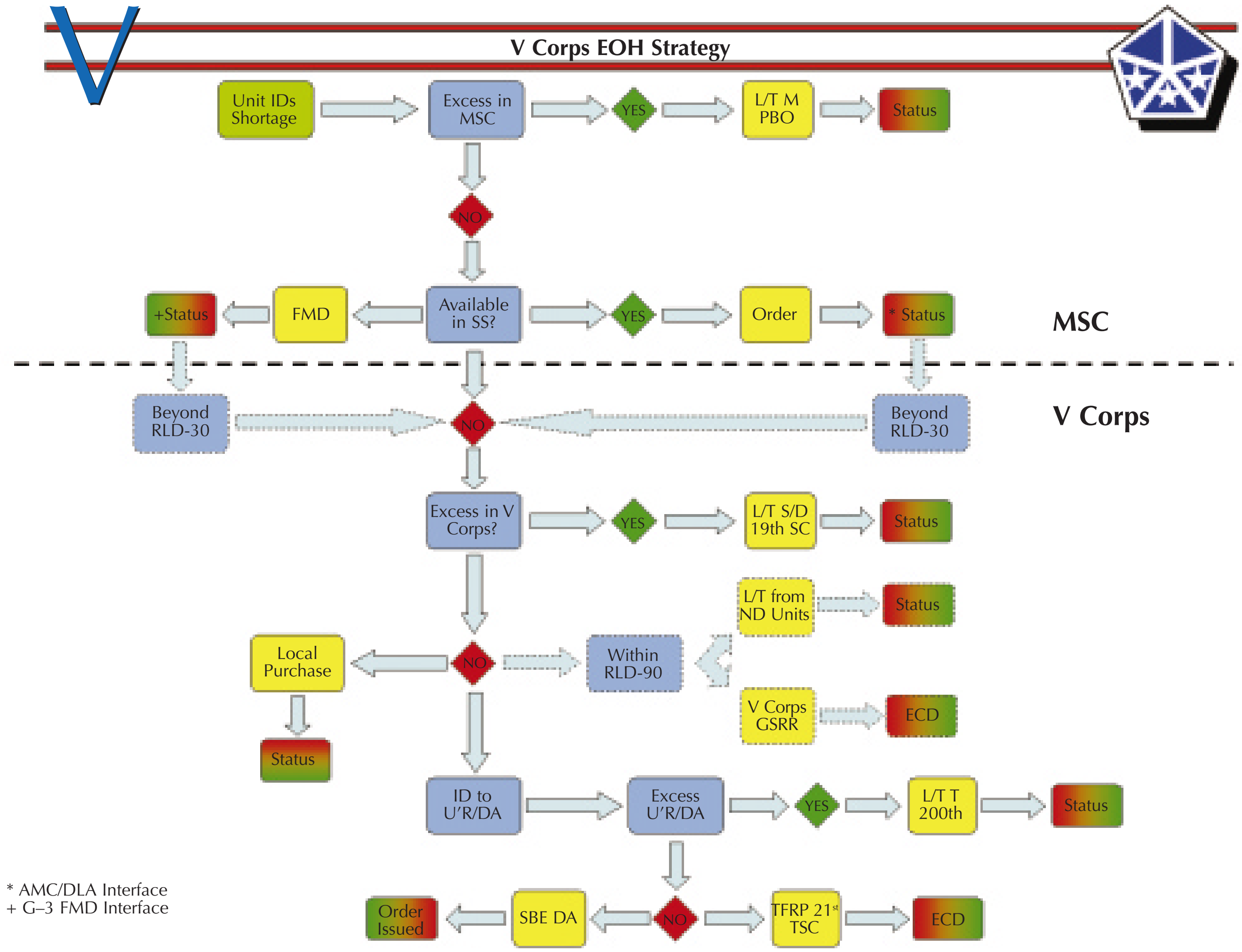
V Corps headquarters and subordinate units from Germany were the backbone of the ground invasion of Iraq. During OIF I and OIF II, almost every unit in V Corps deployed to Iraq, including the 3d Corps Support Command (COSCOM), 1st Armored Division, and 1st Infantry Division (Mechanized). When the units redeployed, they faced two equipment problems: They had returned without all of their equipment, and much of the equipment that was redeployed with them needed extensive repair.

The first problem—returning without all of their equipment—was caused by a new concept created by Headquarters, Department of the Army (HQDA), called "stay-behind equipment" (SBE). SBE is the term used to describe equipment that a redeploying unit either leaves permanently in theater or transfers to the unit replacing it.

The second problem—returning equipment needing extensive repair—was created by the condition of the redeployed equipment. Much of the equipment the V Corps units shipped back to Germany required general support- or depot-level repairs. These repairs were performed by a U.S. Army Europe (USAREUR) program called general support repair and return (GSRR). However, sending the equipment to GSRR did not solve the problem entirely because the rapid pace of deployments to OEF and OIF did not allow enough time for all equipment in the GSRR program to be repaired.

Business Rules

Where do you start when trying to equip forces under unusual situations? Our answer in the V Corps G–4 was to define a new set of business rules for the changed environment. The first area that had to be addressed was determining the equipment deploying units need to execute their assigned missions—particularly the mission of training for the next OIF or OEF rotation. The traditional method of ensuring that a unit has the equipment it needs is to review its modification table of organization and equipment (MTOE), identify shortages, and order against those shortages. However, the demand placed on the system by the rapid operating tempo of the Army, and USAREUR in particular, required the V Corps G–4 to dig a little deeper. We asked the deploying unit commanders to determine the equipment they needed to conduct their missions and



Legend

AMC	**= Army Materiel Command**	**PBO**	**= Property book office**
DA	**= Department of the Army**	**RLD**	**= Ready-to-load date**
DLA	**= Defense Logistics Agency**	**SBE**	**= Stay-behind equipment**
ECD	**= Estimated completion date**	**SC**	**= Support command**
EOH	**= Equipment on hand**	**S/D**	**= Separate brigade or division**
FMD	**= Force Management Division**	**SS**	**= Supply and services**
GSRR	**= General support repair and return**	**T**	**= Theater**
ID	**= Identification**	**TFRP**	**= Theater Fleet Refurbishment Program**
L/T M	**= Lateral transfer from MSC**	**TSC**	**= Theater Support Command**
MSC	**= Major subordinate command**	**U'R**	**= USAREUR (U.S. Army Europe)**
ND	**= Nondeployable**		

then categorize the equipment's impact on their missions as critical or minor. This equipment list would include not only MTOE-authorized equipment but also equipment required because of an approved operational needs statement. We then used this equipment set as the baseline for filling the equipment requirements of deploying units.

The next step in equipping the forces was to identify possible ways of obtaining equipment to meet the requirements. The identified methods were—

- Order equipment through the supply system.
- Laterally transfer excess equipment from another V Corps unit.
- Purchase commercial off-the-shelf equipment locally.
- Laterally transfer excess equipment from other USAREUR units, including equipment in the Theater Fleet Refurbishment Program.
- Laterally transfer authorized equipment from a nondeploying unit.

302ND MI BN (OPS)

UNIT	LIN	Nomenclature	Impact	ERC	REQ	AUTH	O/H	Short	S Rating	MSC Strategy	CORPS Strategy	DOC# or L/T#/Status or Unit/ESD or S-Date (MSC) DOC# or L/T#/Status or Unit/ESD or S-Date (Corps)
302 MI	T57382	Tool Kit TK-17	R	A	31	31	31	0	S1			ITEM RECEIVED COMPLETE
302 MI	V94466	Test Set Tele AN/USM-181	A	A	1	1	0	1	S4		LT-S	OBSOLETE LIN DELETED FROM FEDLOG LT5091R01 1EA 32 SIG (T49348)
302 MI	W37388	Tool Kit TK-105	A	A	6	6	6	0	S1			ITEM RECEIVED COMPLETE
302 MI	Z36072	Key Processor TSEC/KOK-22	A	A	2	2	0	2	S4		S	Cannot requistion Z Lin's POTENTIAL SBE NOMINATION
302 MI	Z84533	Test Set AN/USM-481	A	A	1	1	0	1	S4		S	Cannot requistion Z Lin's POTENTIAL SBE NOMINATION
302 MI	D60801	Digital Non Secure DNVT	R	B	28	28	28	0	S1			ITEM RECEIVED COMPLETE
302 MI	D78555	Data Transfer Device AN/CYZ-10	R	B	18	18	7	11	S4	O	LT-S	W81C4R42040018 (2) BB 5112; W81C4N41000039 (9) BB 5030 LT5086D54 11 EA 32 SIG (200/240) 27 APR 05
302 MI	N04596	NVG TVS-5	R	B	8	8	6	2	S2	O	S	W81C4P50820008 (1); W81C4N42050006 (1) BB 5112 2EA HI PRI 200 MMC
302 MI	N05482	NVG PVS-7	R	B	76	76	61	15	S2	O	LT-D	W81C4N41000013 (15) BB 5184 LT5131J20 15EA 1ID, 11 JUN 05

CDR'S ASSESSMENT OF IMPACT ON COMBAT MISSION
R - CRITICAL A - MINOR

LATERAL TRANSFER TYPE
L/T M - MSC L/T S - SEP BDE L/T D - DIV L/T T - THTR

STATUS
R - CRITICAL A - PENDING G - COMPLETE

STRATEGY
L/T - LATERAL TRANSFER O - ORDER S - SBE LP - LOCAL PURCHASE T - TFRP G - GSRR F - FWD TO U'R

This tracking tool was developed to document the resourcing process. Each deploying unit submitted an updated form to the V Corps G–4 weekly.

• Redirect GSRR equipment from another unit.

• Request that the equipment be identified as SBE by HQDA, which would mean the equipment would be waiting when the unit reached Iraq or Afghanistan.

Once we had identified the equipment sources, we developed a flow chart that laid out all of the decision points and established a hierarchy for equipment resourcing solutions. (See chart on page 43.) We used the chart to formalize the process, establish a consistent methodology, and identify the priority of methods for obtaining needed equipment. The methods chosen were, in order—

• Laterally transfer excess equipment within the deploying V Corps major subordinate command (MSC).

• Order needed equipment through the supply system.

• Laterally transfer excess equipment from another V Corps MSC.

• Purchase equipment locally.

• Laterally transfer excess equipment from another USAREUR unit.

• Identify equipment to HQDA as an SBE request.

We also specified some situations (identified with broken lines on the chart) that would require us to change the strategy based on each deploying unit's cargo ready-to-load date (RLD). In these situations, authorized equipment would be transferred from nondeploying units or redirected from the GSRR program to the deploying unit.

Monitoring Progress

After establishing a set of business rules for resourcing strategies, we needed a way for units to report and track strategy execution. Using the information units provided to us, information we provided to the units, information needed by V Corps leaders, and information that had to be reported to USAREUR,

we developed the tracking tool shown at left. We then developed the timeline and instructions for executing the tracking tool. Each deploying unit would have to submit the completed form weekly. This would allow us to provide timely and accurate data to V Corps and USAREUR, provide the latest requirements to V Corps's materiel management center—the 19th Support Center—and provide updates to the deploying units.

The next step was to gather the data from the deploying units and apply the business rules to see how effective these rules would be in meeting the unique challenges V Corps faced.

Practical Application

When V Corps units prepared to deploy to OIF 04–06 and OEF 04–06, the unit commanders determined that they needed over 9,000 major end items. [A two-number designator is now used to identify OIF and OEF rotations.] To demonstrate how the process worked, I have chosen three units that posed different resourcing challenges: Task Force 7th Battalion, 159th Aviation Regiment (Aviation Intermediate Maintenance [AVIM]) (TF 7–159 AVIM); TF 165th Military Intelligence Battalion (TF 165 MI); and 619th Movement Control Team (MCT).

TF 7–159 AVIM, which belongs to the 3d COSCOM, was directed to leave much of its equipment in Iraq when it redeployed from OIF I. As a result, the unit was short 153 pieces of MTOE equipment as it prepared to deploy to Afghanistan in support of OEF 04–06. The unit commander also identified an additional nine pieces of equipment that would be needed to support the unique requirements of the mission in Afghanistan. The request for authorization to obtain these items was submitted through the V Corps and USAREUR G–3 Force Management Divisions to HQDA, where it was approved. So those nine additional items also had to be resourced.

The first step, according to the new business rules, was to have the 3d COSCOM review the property records of the MSCs to determine if any of the needed items were excess in other units. This resulted in the transfer of only one piece of equipment. The next step was to see what could be procured through the supply system before the cargo RLD. This resulted in the identification of 51 items as either on hand at the 200th Materiel Management Center (MMC) warehouse or available through the Army supply system.

The next area checked was excess within other V Corps units. The V Corps G–4 Supply and Services Division, in coordination with the 19th Support Center Equipment Redistribution Branch, conducted a line item number (LIN) review of all required items in V Corps using data from both Property Book Unit Supply Enhanced (PBUSE) and the Web Logistics Integrated Data Base (WebLIDB). This resulted in the lateral transfer of 17 pieces of equipment from units within the corps. The remaining items were identified to the USAREUR G–4 as being unresourced within the corps. Of these, USAREUR was able to provide an additional three pieces of equipment. An official request for SBE was submitted for the items that USAREUR could not provide. HQDA published Fragmentary Order 32 to Operation Order 04–01, which provided all but two pieces of the equipment that had been requested based on an operational needs statement submitted by 3d COSCOM. The unit commander confirmed that, since the TF would be operating in multiple locations, the equipment was still required to execute the mission, and the requirement was returned to the V Corps G–4 for resourcing. Further research revealed that the only source of the equipment was the unit that TF 7–159 AVIM would be supporting during the deployment, so V Corps directed the task force to deploy without the two pieces of equipment.

TF 165 MI Deployment

TF 165 MI was an ad hoc organization created by the 205th MI Brigade to support Combined Joint Task Force (CJTF) 76 in Afghanistan. It consisted of several reconfigured companies from the 165th MI Battalion, a company from the Army Forces Command, and a company created with new Soldiers from the Army Training and Doctrine Command. The TF had no standard MTOE, so, with the assistance of the V Corps and USAREUR Force Management Divisions, it created a provisional MTOE.

The provisional MTOE required 1,211 pieces of equipment. However, no excess equipment was available within the MSC for resourcing these shortages because the unit was created from scratch. Moreover, the unit could not order the new items through the supply system because the MTOE was provisional. Thus, the unit had to begin its equipping process by looking for excess equipment in other V Corps units. This search identified 208 pieces of excess equipment that could be laterally transferred. Next, 265 pieces of equipment or like items were identified that could be purchased locally by the unit. The remaining list of items needed was sent to the USAREUR G–4. USAREUR identified 45 pieces of excess equipment that were available either from the 200th MMC warehouse or through the Theater Fleet Refurbishment Program. A request for the remaining items was forwarded to HQDA as an official SBE nomination. HQDA published two fragmentary orders identifying SBE items for the task force. However, some of the requested items were not approved as SBE, which meant that new sourcing

solutions had to be found. An additional 106 items were identified that could be locally purchased or fabricated, 52 items were added to an existing CJTF 76 fielding plan, and the last 13 items were identified as items that could be laterally transferred from nondeploying V Corps units. TF 165th MI ultimately deployed with, or was fielded in theater, all equipment required by the provisional MTOE.

619th MCT Deployment

The 619th MCT is a 13-person detachment that would operate semi-independently because of the large area of responsibility and widely dispersed supply routes in Iraq. However, since the MCT was not designed to operate independently of a higher headquarters for force protection and command and control, it was not equipped with the proper weapons, radios, and vehicles to support those missions. The unit commander identified 1 piece of critical MTOE equipment that was not on hand and 32 pieces of equipment that were required because of an approved operational needs statement.

The 3d COSCOM found four pieces of excess equipment. One piece of equipment was available through the supply system. Although we were unable to identify excess in other V Corps units to fill any of the shortages, we arranged for four additional items to be shipped from the continental United States and two systems to be added to the Blue Force Tracker System theater fielding plan. We requested the remaining items from USAREUR. The USAREUR G–4 provided 16 pieces of equipment, including equipment from other units, equipment returning from the Balkans, and equipment from the 200th MMC warehouse.

An SBE request was submitted to HQDA for the final five pieces of equipment. However, all SBE nominations were denied because the unit was not replacing an existing unit in theater. This required V Corps to transfer four items from nondeploying units and USAREUR to issue one item from the 200th MMC warehouse that had previously been designated to fill a shortage in another deploying unit. Ultimately, the 619th MCT deployed with all required MTOE equipment and all items it needed to meet the unique challenges of its mission.

Revised Strategy

During the course of nearly 9 months of equipping the force for OIF 04–06 and OEF 04–06, V Corps modified and refined the process described above. We realized that trying to resource all deploying units at the same time is both cumbersome and impractical. We also found additional efficiencies in the process of identifying possible resources. In response to these lessons learned, we decided to divide the units deploying to OIF 05–07 and further formalize our LIN review process for shortages. We first divided the deploying units into three bands based on their respective cargo RLDs. We began identifying and resourcing critical equipment shortages 120 days before the unit RLDs. This allowed us to focus on a smaller group of units and resource them before we resourced later-deploying units. Next, we began the LIN review using PBUSE and WebLIDB as soon as the shortages were identified. This allowed the 19th Support Center to be included in the equipment resourcing at an earlier stage and allowed us to validate the accuracy of the reported unit data.

The new process refinements were tested immediately after the USAREUR and V Corps prepare-to-deploy order for OIF 05–07 identified four V Corps units to deploy. These units had between 30 and 45 days to resource all equipment shortages before their cargo RLDs. This short notice forced us to abbreviate the established equipping process. However, we found that, by following the same basic business rules and applying the refinements developed during the previous 9 months, we were still able to resource the early-deploying units successfully. Of the 58 items that the four units required, only four items in the 77th Maintenance Company (Direct Support) could not be fully resourced. Ultimately, those shortages were determined to have only a minor impact on the unit's ability to conduct operations. The other three units were resourced fully through a combination of short-notice lateral transfers, equipment issues from the 200th MMC warehouse, theater fielding programs, and HQDA-approved SBE.

The challenges of equipping the force for large-scale, ongoing missions require Army logisticians to develop new ways of solving shortages. They must be flexible and adaptive in resourcing each piece of equipment that a unit commander needs to accomplish his wartime mission. The new set of business rules, tracking tool, and subsequent refinements have allowed the V Corps G–4 to equip 33 units with over 9,000 pieces of equipment for deployments in support of OIF and OEF. With these business rules, we are prepared to continue to resource all future equipment requirements. **ALOG**

Major Noah Hutcher is the Chief of the V Corps G–4 Supply Branch in Heidelberg, Germany. He has a B.A. degree in architecture from the University of California at Berkeley and an M.S. degree in education from Kansas State University. He is a graduate of the Infantry Officer Basic Course, the Combined Logistics Officers Advanced Course, and the Army Command and General Staff College.

Joint Logistics for the EUCOM AOR

BY RANDY S. KENDRICK

In the first of two articles on joint theater logistics concepts for the U.S. European Command area of responsibility, the author reviews the need for centralized logistics command and control.

Department of Defense (DOD) logistics transformation efforts and evolving joint and combined operational concepts have increased expectations for dramatically improved logistics operations through more effective, efficient, and responsive use of available theater resources. The planned force drawdown in Europe will cause the U.S. European Command (EUCOM) service components to depend increasingly on one another for logistics support. The service components can no longer afford to retain redundant force structure where joint efficiencies can be gained. However, providing joint logistics presents problems that must be addressed to ensure that joint logistics operations are effective and efficient.

Joint Logistics Problems

Findings from a variety of joint and service-sponsored assessments cite shortcomings to operational effectiveness because there is no joint theater logistics command or management capability. Relevant observations from the Office of the Secretary of Defense, the Joint Staff, the U.S. Joint Forces Command, the U.S. Central Command (CENTCOM) Deployment and Distribution Operations Center, the Defense

This article expresses the views of the author, not the Department of Defense or any of its agencies.

Members of the 173d Airborne Brigade inspect Container Delivery System bundles before loading them onto a C–130J aircraft.

Science Board, and the Army Science Board can be summarized in the following five categories—

• Lack of a joint logistics organization to ensure that joint logistics functions are executed in support of the theater. Joint Publication (JP) 4.0, Doctrine for Logistic Support of Joint Operations, outlines joint theater-level logistics functions, including supply; maintenance; transportation; civil engineering; health services; and other services, such as life support, postal, and finance. However, execution of these functions is typically characterized by "ad hocery" and discovery learning.

• Lack of a theater-level logistics commander. The combatant commander (COCOM) is responsible for theater-level logistics functions, but no subordinate commander is charged with executing that mission. A joint theater logistics commander is needed to provide theater logistics command and control, thereby freeing the COCOM and his J–4 to plan and coordinate long-range effects. Without an empowered logistics commander, the COCOM has no assurance that logistics operations are effectively monitored, executed, and managed and optimizing joint logistics capabilities in the theater is difficult, if not impossible.

• Inability to execute directive authority for logistics (DAFL). DAFL is a unique component of COCOM authority. Effective joint logistics cannot be achieved based on an expectation of cooperation among the services; it must be based on the COCOM's exercising directive authority through subordinate commanders.

• Lack of logistics command and control. A logistics command and control organization is essential to making COCOM DAFL a reality. To be effective, DAFL must be a command function, not a staff function.

• The COCOM's inability to see requirements and respond with the appropriate capabilities.

Each of these observations highlights the fact that the rate of change in logistics has failed to keep pace with the rate of change in the nature of warfare. In a 1999 North Atlantic Treaty Organization Research Fellowship Paper, "Coalitions of the Willing: NATO and Post-Cold War Military Intervention," Robert P. Grant predicted, "Military operations will become even more joint or interservice in nature, and continued movement towards increasingly joint military structures will take place as well." Although the first part of this prediction has proven true, the second has not. Operations Enduring Freedom and Iraqi Freedom have attested to the new nature of joint warfare, but the services continue to provide logistics support in a Cold War-era, service-stovepiped manner.

EUCOM service component logistics operations have evolved over the years to meet their own service-unique missions and statutory responsibilities. For single-service operations, an organic logistics arrangement is generally sufficient to achieve mission success. However, in joint operations, stovepiped component logistics systems are often incompatible, redundant, and ineffective for rapidly responding to the ever-changing priorities of the EUCOM commander.

The Joint Staff J–4 has concluded that, since the inception of joint military operations, joint theater logistics management often has been ineffective and inefficient. Logisticians are slow to gain visibility of requirements, and the means to quickly fill them are frustrated. It is difficult, if not impossible, to monitor joint operational logistics capabilities as they move from their source through strategic lines of communication and tactical levels to meet joint force objectives. This problem is exacerbated by the operational tempo of the Global War on Terrorism.

Real-Life Iraqi Freedom Problems

EUCOM support to Operation Iraqi Freedom provided a classic example of the problems that can arise when the COCOM does not have a single organization designated to manage joint theater logistics. In late 2002, EUCOM began deploying personnel to Ankara, Turkey, as part of EUCOM (Forward). Each EUCOM directorate sent personnel to plan and coordinate troop movement through Turkey into Iraq. The arrangement was ad hoc, with personnel rotating in and out daily. Each service, such as U.S. Army Europe (USAREUR) and U.S. Air Forces in Europe (USAFE), also sent a team to Turkey to coordinate directly with the Turkish General Staff and to collaborate with the EUCOM J–4 (Forward). These missions were disjointed, had no clear objectives or continuity, and failed to provide a single face to the Turkish General Staff.

> Many logisticians agree that joint management and control increase synchronization and reduce redundancy in interdependent and interoperable processes.

In March 2003, CENTCOM tasked EUCOM, as a supporting COCOM, to provide operational-level logistics support to the 173d Airborne Brigade from Vicenza, Italy, and Joint Special Operations Task Force-North forces operating in northern Iraq. EUCOM, in turn, tasked USAREUR and USAFE separately to execute the deployment and sustainment. However, without a single logistics commander overseeing the effort, confusion abounded. For example, when the Air Mobility Command pulled the tanker

airlift control element out of Oguzeli, Turkey, it was unclear whether USAREUR or USAFE would provide a backfill capability.

Sustainment flow from Ramstein Air Base, Germany, to northern Iraq switched from common-user channel support to contingency support and then back to channel support. The procedures for documenting the cargo and prioritizing and tracking the flow switched accordingly. The sustainment flights from Ramstein to northern Iraq supported both the 173d Airborne Brigade and Joint Special Operations Task Force-North. However, no one on the EUCOM staff was setting priorities of flow for the two customers. As a result, the 18 available pallet positions on the daily air transport were filled on a first-in-first-out basis rather than giving priority to supporting the customer that was more engaged in the fight. Using the first-in-first-out process often resulted in critical air capacity being wasted on nonessential cargo.

Joint Logistics Management

Some logistics business processes lend themselves to joint efficiencies; others do not. Logistics capabilities fall into three categories: service independent, service interdependent, and service interoperable. Service independent processes, such as naval replenishment at sea, are unique to a single service and are not candidates for joint logistics. Service interdependent processes are those in which multiple services depend on one another to accomplish a task. A good example is aerial port throughput, in which the Air Force lands the planes and discharges the cargo and the Army stages the cargo and clears the port. Service interdependent processes lend themselves to joint management and control. Service interoperable processes are those in which multiple services share a redundant capability, such as contingency contracting. With interoperable processes, common servicing or cross-servicing improves the efficiency of the operation. This also requires joint management and control.

Many logisticians agree that joint management and control increase synchronization and reduce redundancy in interdependent and interoperable processes. The Joint Theater Logistics Management Implementation Plan published by the Joint Staff concluded that common-user, cross-functional, and joint-functional assets and capabilities may be appropriately managed and controlled centrally at the COCOM J–4 level or by a joint theater logistics command (JTLC) rather than delegated to individual component commands.

EUCOM J–4 briefings state that efforts to improve theater logistics rely on several self-evident truths. First, a joint organizational construct must possess and execute DAFL. Second, this organization must use the reachback capabilities of the national logistics partners and the inherent capabilities of the service components. Finally, this organization must synchronize joint efforts to execute inherently joint tasks. Joint management and control does not require execution of inherently joint tasks associated with these processes, but rather synchronization of the execution. Synchronization requires visibility over each component's role in the process and the authority to direct service components to cross-level capabilities and assets as necessary to support the COCOM's priorities.

Managing logistics processes at the joint level is a daunting task for the COCOM. However, failure to do so will result in redundancies and a lack of synchronization of processes eligible for joint management. The COCOM needs a control mechanism empowered with the legal authority to exercise DAFL on his behalf.

Logistics Authority

Logistics authorities have their legal basis in U.S. Code (USC) and their prescribed application in joint doctrine. Title 10, USC, chapter 6, section 165(b), describes the statutory requirement for the individual military departments to provide logistics support to forces assigned to the COCOMs. Section 164 of the same chapter describes the COCOM's combatant command authority (also called COCOM). Title 10 describes COCOM authority as the basic authority to perform those functions of command that involve organizing and employing commands and forces, assigning tasks, designating objectives, and "giving authoritative direction to subordinate commands and forces necessary to carry out missions assigned to the command, including *authoritative direction* over all aspects of military operations, joint training, and *logistics*" (emphasis added). Thus, DAFL is derived from the COCOM authority of section 164. The purpose of DAFL, according to Joint Publication 0–2, Unified Action Armed Forces, is to ensure the "effective execution of approved operation plans; effectiveness and economy of operation; and prevention or elimination of unnecessary duplication of facilities and overlapping of functions among the Service component commands."

Although COCOM authority (and by extension DAFL) cannot be delegated or transferred without Presidential or Secretary of Defense approval, it can be exercised through subordinate joint force commanders and service or functional component commanders. Since DAFL is an element of command authority, its exercise also should be restricted to commanders rather than to staff elements such as the J–4.

JP 0–2 gives a unified commander the authority to establish functional component commands in order to "integrate planning; reduce . . . span of control; and/or significantly improve combat efficiency, information flow, unity of effort, weapon systems management, (or) component interaction." If a COCOM determines

In this example of an interdependent operation, an Airman from the 746th Expeditionary Airlift Squadron and Soldiers from the 173d Airborne Brigade load Container Delivery System bundles onto a C–130J transport for an equipment drop.

that logistics processes within his theater can be better synchronized and more efficient, he can establish a JTLC in accordance with JP 0–2 and specifically authorize the JTLC to exercise DAFL on his behalf for as many common support capabilities as required to accomplish the JTLC's mission. Common support capabilities and the corresponding logistics authority may be defined as broadly or as narrowly as the COCOM desires.

Therefore, while overall responsibility for logistics support remains with the individual service components, the COCOM may exercise DAFL to promote synchronization of logistics support. Furthermore, the COCOM has the requisite legal authority to establish a JTLC to exercise DAFL on his behalf. However, this is only one of the logistics support options available to the COCOM.

Logistics Support Options

COCOMs may choose from a variety of logistics support options to fulfill the needs of their areas of responsibility (AORs). The logistics support system must operate in harmony with the structure and employment of the combat forces it supports. Whenever feasible, chains of command and staffs in a noncontingency environment should be organized as they would be in wartime to avoid reorganization in the midst of a contingency. Options for support include—

Each service component provides its own logistics. Title 10, USC, chapter 6, section 165(b), requires the individual military departments to provide logistics support to their forces assigned to the COCOMs. Having each service provide its own logistics yields clear command and control arrangements, alleviates Title 10 concerns, and gives the component commander the greatest logistics flexibility. However, this method results in redundancy and wasted resources while limiting the flexibility of the COCOM. This is the current method of choice in the EUCOM AOR, except for common-user functions identified in EUCOM Directive 60–11, Common User Logistics in the USEUCOM AOR, and the functional logistics boards, centers, and offices at the EUCOM level.

A lead service oversees common-user logistics functions. Common-user logistics is defined in JP 1–02, Department of Defense Dictionary of Military and Associated Terms, as "Materiel or service support shared with or provided by two or more Services, Department of Defense (DOD) agencies, or multinational partners to another Service, DOD agency, non-DOD agency, and/or multinational partner in an operation. Common-user logistics is usually restricted to a particular type of supply and/or service and may be further restricted to specific unit(s) or types of units, specific times, missions, and/or geographic areas." EUCOM Directive 60–11 assigns lead service and agency responsibilities for seven functions (aerial ports, ocean cargo terminals, organic military highways, customs, traffic management, mortuary services, and base operations support) in 33 countries (resulting in 231 total assignments), which still does not cover the entire AOR. With the potential for short-notice expeditionary operations to new countries, sorting out lead service and agency responsibilities can waste precious time. The COCOM would not have a single organization responsible for logistics, but rather various services or agencies to which a laundry list of functions are parceled out in unequal measures.

CENTCOM tried to use a lead-service arrangement for contracting but found this method less desirable than a joint contracting command. CENTCOM stated during a joint theater logistics meeting hosted by the Joint Staff that the lead-service arrangement had no mechanism for tracking contingency contracting purchases. Contracting officers were empowered by their services to spend operations and maintenance funds. These expenditures often were not in line with

COCOM priorities, and there was virtually no visibility on this spending.

An appointed executive agent provides logistics support to all services. Executive agency is similar in nature to a lead service for common-user logistics but differs in level of appointment. "Executive agent" is a term used to indicate a delegation of authority by the Secretary of Defense to a subordinate, such as a military department or Defense agency, to act on the Secretary's behalf. Designation as an executive agent, in and of itself, confers no authority. The exact nature and scope of the authority delegated must be stated in the document designating the executive agent. An executive agent may only provide administration and support or coordinate common functions, or it may be delegated authority, direction, and control over specified resources for specified purposes. Executive agency, like a lead-service arrangement, reduces redundancy but results in fragmented responsibility. Since executive agency is designated by the Secretary of Defense to the services themselves, it may not be in line with a COCOM's needs or desires for logistics organization.

An expanded J–4 staff coordinates joint logistics effects. The COCOM may choose to coordinate joint logistics effects through his J–4 staff. EUCOM has had several operational-level centers and offices, including the Intratheater Commercial Transportation Branch, the Joint Movements Center, the Joint Petroleum Office, and the Joint Blood Program Office. In May 2005, EUCOM established the EUCOM Deployment and Distribution Operations Center (EDDOC) by combining the Intratheater Commercial Transportation Branch and the Joint Movements Center. The EDDOC enhances the J–4's ability to link strategic deployment and distribution processes to operational requirements.

In a contingency, the EDDOC's scope expands to include the Joint Logistics Operations Center, which oversees engineering, materiel readiness, contracting, fuel, and ammunition functions. Unfortunately, to exercise any semblance of DAFL, the EDDOC must prepare a tasking message for the J–3 to issue to the component commands. Although expanding the J–4 staff to achieve joint effects should result in a clear understanding of J–3 guidance and priorities, placing the operational burden on the J–4 staff results in a cumbersome application of DAFL and diminishes the staff's ability to concentrate on long-range planning.

A JTLC coordinates joint logistics effects. The COCOM's fifth option is to create a single logistics command responsible for coordinating and executing joint theater logistics. This reduces the redundancies that exist when each service component provides its own logistics, gives the COCOM a single organization to integrate, prioritize, and synchronize joint theater logistics, improves coordination with coalition partners, and provides a command and control architecture that can rapidly expand and deploy during a large-scale contingency. Potential disadvantages include a loss of flexibility and control by service components, increased service manpower costs if the JTLC fails to eliminate duplication of effort, and a perceived layering of logistics authority.

U.S. Forces Korea (USFK) is currently experimenting with the concept of a joint logistics command for the Korean peninsula. In partnership with the U.S. Joint Forces Command, the U.S. Pacific Command, and the U.S. Transportation Command, USFK is conducting a series of war games to determine the most effective method for the USFK commander to exercise command and control over operational-level logistics.

Although all of these methods, except the one in which services provide their own support exclusively, may achieve some joint effects, the efficiency and effectiveness of each varies. The problems EUCOM has encountered while supporting Operation Iraqi Freedom overwhelmingly support a single entity responsible for theater logistics. Furthermore, the Defense Science Board's conclusion that "to be effective, logistics must be a function of command rather than staff" and the legal discussion that COCOM authority (and thus DAFL) can be exercised only through commanders eliminate using an expanded J–4 staff to coordinate joint logistics effects as an effective solution. Thus, a command and control arrangement such as a JTLC is the only option that fully addresses the observations and shortcomings experienced during Operation Iraqi Freedom.

Perhaps it is time for EUCOM to try this novel approach so that it will not have to scramble to establish an ad hoc joint logistics structure after joining the battle. COCOMs must train as they fight and posture themselves for success before the next battle begins.

A follow-on article on emerging Joint Theater Logistics Command/Joint Force Support Component Command concepts, their relationships to other theater commands, and their role in a contingency will be published in the next issue of *Army Logistician*. **ALOG**

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Who Rules Logistics? Service Versus COCOM Authority

BY COLONEL CHRISTOPHER R. PAPARONE

There is a lot of ongoing dialog and email traffic these days on the subject of service versus combatant command (COCOM) authority over theater logistics. The issue stems from a desire to use theater-level support capabilities efficiently. Joint commanders also want the authority to penetrate the intheater stocks of one service to "borrow a cup of sugar" when another service needs something that the first service has. Who controls and directs the transfer of capabilities that otherwise would follow the normal service supply chain and fiscal and accountability requirements?

Command Authority Rooted in Law

The foremost factor influencing the dialog about service versus COCOM authority is the law, in particular Title 10 of the U.S. Code (10 USC), Chapter 6, and how it establishes COCOM authority. According to 10 USC 164(c)(1)—

> Unless otherwise directed by the President or the Secretary of Defense, the authority, direction, and control of the commander of a combatant command with respect to the commands and forces *assigned* [emphasis added] to that command include the command functions of—
>
> (A) giving authoritative direction to subordinate commands and forces necessary to carry out missions assigned to the command, including authoritative direction over all aspects of military operations, joint training, and logistics; . . .
>
> (F) coordinating and approving those aspects of administration and support (including control of resources and equipment, internal organization, and training) and discipline necessary to carry out missions assigned to the command; . . .

The law also addresses the responsibilities of the military departments and services. Under 10 USC 3013(b), 5013(b), and 8013(b), the secretaries of the military departments are responsible for the internal organization, training, logistics, readiness, control of resources and equipment, mobilization, demobilization, administration, support, and discipline of all service commands and forces, including those assigned to COCOMs. These stipulations in law present a quandary to the Secretary of Defense, who has to reconcile these competing legal authorities.

Determining Scope of Authority

Two executive branch documents also are instrumental in helping the Secretary of Defense sort out the authorities given to the services and the COCOMs. The first is a memorandum that apportions service forces to COCOMs as determined by the President, the Secretary of Defense, and the Chairman of the Joint Chiefs of Staff. The general rule is that a service component force can be assigned to only one combatant commander (CoCOM). ["CoCOM" refers to the position of a combatant commander. "COCOM" refers to the combatant command authority described in 10 USC, chapter 6.] Nevertheless, the same force might be directed to serve in a supporting role to another CoCOM; for example, that force may be placed under the operational control (OPCON) of another CoCOM.

As indicated in 10 USC, Chapter 6, the Secretary of Defense can decide to transfer combatant command authority from one CoCOM to another, but he typically decides to give the receiving commander a more temporary authority—OPCON. Unlike COCOM authority, OPCON is not a legal term but a doctrinal one and, according to Joint Publication (JP) 1–02, Department of Defense Dictionary of Military and Associated Terms, includes—

> . . . authoritative direction over all aspects of military operations and joint training necessary to accomplish missions assigned to the command . . . . Operational control normally provides full authority to organize commands and forces and to employ those forces as the commander in operational control considers necessary to accomplish assigned missions; *it does not, in and of itself, include authoritative direction for logistics* or matters of administration, discipline, internal organization, or unit training. [Emphasis added.]

The second important executive branch document is the Unified Command Plan, which establishes the missions and geographic boundaries of the COCOMs. These missions and boundaries are important in determining authorities because they delineate when a CoCOM would be designated a supporting CoCOM or a supported CoCOM to meet an operational requirement. Transfers of authority occur when a supported CoCOM

does not have sufficient capability within his assigned forces to do the assigned job and requires support from another Department of Defense (DOD) command or agency. To deploy or redeploy supporting forces from one mission or region to another, the Secretary of Defense must approve an execution, deployment, or redeployment order. In those orders, the authorities (such as OPCON) that will be given to the supported commander are specified.

Directive Authority for Logistics

JP 0–2, Unified Action Armed Forces (UNAAF), provides doctrinal "how to" instructions for executing Title 10 authorities and implementing the executive branch documents. This publication describes the command relationship options available to the Secretary of Defense and supported CoCOMs as they plan how command relationships will work for the forces they are allocated (usually OPCON) or the forces reassigned to them (requiring a transfer of authority between COCOMs). JP 1–02 defines a doctrinal term (not a legal term), "directive authority for logistics" (DAFL), as—

> Combatant commander authority to issue directives to subordinate commanders, including peacetime measures, necessary to ensure the effective execution of approved operation plans. Essential measures include the optimized use or reallocation of available resources and prevention or elimination of redundant facilities and/or overlapping functions among the Service component commands.

Conspicuously absent in this definition is reference to authority over assigned forces, giving the inaccurate impression that CoCOMs automatically have this authority over all subordinate commanders.

JP 4–0, Doctrine for Logistic Support of Joint Operations, attempts to describe how the logistics authority vested in Title 10 (under COCOM authority) can be used specifically by the supported CoCOM over his assigned forces. This doctrine constrains statutory COCOM authority in that it specifies that the CoCOM "must formally delineate . . . delegated directive authority by function and scope to the subordinate joint force commander (JFC), service component commander, or DOD agency." This statement adds some confusion to the discussion because it is hard to think of any DOD agency, or portion thereof, that would be assigned to the CoCOM, so COCOM authority would not apply.

There is no direct connection between the CoCOM's planning and execution of common user support and the DAFL derived from 10 USC, Chapter 6. JP 4–0 seems to link these two concepts incorrectly. This doctrinal pursuance of DAFL seems to add to the confusion. Nevertheless, JP 4–07, Joint Tactics, Techniques, and Procedures for Common-User Logistics During Joint Operations, does a commendable job of describing practical ways of executing joint logistics efficiencies during operations (which is what we are really after).

JP 4–0 also has a discussion of common-user logistics (CUL) that attempts to break DAFL down into manageable types of supply and services as defined by the CoCOM. Yet the discussion of CUL should not follow from the discussion of DAFL—they are not necessarily related. CUL is not a subset of DAFL, as JP 4–0 seems to imply. There are other, perhaps more appropriate, ways to achieve CUL efficiencies. JP 4–07 offers key tools for the CoCOM to use in deciding how he will execute CUL and achieve the efficiencies he seeks—

> When properly implemented, common-user logistics (CUL) can produce significant efficiencies by eliminating duplication provided by Service components . . . . Source documents include DOD directives and instructions, inter-Service support agreements [ISSAs], and acquisition and cross-servicing agreements (ACSAs) as well as combatant commander operation plans (OPLANs), operation orders (OPORDs), and directives.

Using Executive Agents

The Secretary of Defense also can appoint executive agents to provide cross-service capabilities. "Executive agent" is defined in JP 1–02 as—

> A term used to indicate a delegation of authority by the Secretary of Defense to a subordinate to act on the Secretary's behalf. An agreement between equals does not create an executive agent. For example, a Service cannot become a Department of Defense executive agent for a particular matter with simply the agreement of the other Services; such authority must be delegated by the Secretary of Defense. Designation as executive agent, in and of itself, confers no authority. The exact nature and scope of the authority delegated must be stated in the document designating the executive agent. An executive agent may be limited to providing only administration and support or coordinating common functions, or it may be delegated authority, direction, and control over specified resources for specified purposes.

The Army, for example, typically establishes these wartime executive agent requirements in approved deliberate operation plans: inland logistics support, inland class I (subsistence), supply support of United Nations

peacekeeping forces, operation of common-user ocean terminals, intermodal container management, transportation engineering for highway movement, common-user land transportation, logistics applications of automated marking and reading symbols, the Military Customs Inspection Program, disposal of waste explosives and munitions, military troop construction, airdrop equipment and systems, power generation equipment and systems, land-based water resources, overland petroleum, oils, and lubricants support, the Military Postal System, the DOD Enemy Prisoners of War and Detainee Program, and blood support.

The supported CoCOM can ask for additional authority to direct cross-service support. If the Secretary of Defense approves the authority requested (for instance, as an addition to authority vested in OPCON), the supported CoCOM will be provided the specific authorities needed to direct one service to logistically support another.

Research Findings

My research has led me to several findings. The most important finding is that the President and the Secretary of Defense have sufficient authority under Title 10 to delegate DAFL over forces provided to CoCOMs.

Second, the use of DAFL potentially can result in unintended consequences. For example, using DAFL may create fiscal accounting and readiness issues with service departments. Use of prenegotiated ISSAs may help offset these undesirable effects.

Third, using "direct liaison authorized" or appointing coordinating authority are more appropriate than giving the supported CoCOM DAFL over—

• Defense agencies, such as the Defense Logistics Agency (the executive agent for fuel and class I), the Army and Air Force and Navy and Marine Corps Exchange Services, and the Defense Contract Management Agency.

• Functional COCOMs, such as the U.S. Transportation Command, which provide, for example, in-theater port services and distribution capabilities.

• Supporting COCOM capabilities located in, or adjacent to, another COCOM's area of responsibility.

• Capabilities assigned to carry out functions of the secretary of a military department, such as the Army Materiel Command's program management of the Logistics Civil Augmentation Program and the associated contingency contract with Halliburton KBR.

• Executive agencies. Current doctrine is unclear on how DAFL might override existing Secretary of Defense designations of executive agents.

I have sought to help clarify the complex nature of authorities vested in the CoCOM by virtue of law and executive branch documents. I distinguish my discussion of COCOM authority from that found in doctrine because I conclude that doctrine (JP 0–2 and JP 4–0) tends to both "over-functionalize" and dilute the authority inherent to COCOMs. I also conclude that much of the confusion over how to execute COCOM authority over logistics stems from a misunderstanding about how forces are allocated (usually OPCON) where, by itself, no such directive authority exists.

I conclude that DAFL (an invention of doctrine writers) is largely a single solution looking for an assortment of problems and not the other way around. The joint logistics community, by focusing on DAFL as the "research question," is committing a "Type III error" (that is, solving the wrong problem with precision.) I see no value in how JP 0–2 separates "directive authority for logistics" from the legal interpretation of COCOM authority. In fact, by attempting to "functionalize" COCOM authority into a "slice" called DAFL, the broad authority over his assigned forces vested in the CoCOM under 10 USC, Chapter 6, is confused and diluted. The authorities for logistics in 10 USC 3013, 5013, and 8013 are given to each service to administer, organize, train, arm, and equip its forces unless the Secretary of Defense approves other arrangements.

There are other, more effective ways to either coordinate or to be delegated specific authority over OPCON forces to achieve cross-servicing efficiencies (through plans, orders, and ISSAs). Creating "fusion cells" in the plans and operations functions of the joint force commander would help this collaborative effort to direct or coordinate cross-service logistics. Granted, these methods take a lot of negotiation and preplanning to achieve. Nevertheless, structuring joint logistics (service interdependencies) cannot be over-simplified. The joint logistics community should focus on these methods of coordination and collaboration rather than on "legal remedies" to determine who shall rule logistics.

There likely will never be a single uniformed authority over all logistics. It is the Secretary of Defense who rules over end-to-end logistics and who has the power to delegate this authority to others as required. This conclusion follows the basic constitutional principle of politically appointed civilian control of the military.

Colonel Christopher R. Paparone is the Deputy Director (J–3/4) for Logistics and Engineering at the U.S. Joint Forces Command. A Quartermaster officer, he has served with various commands and staffs in his 27 years of active duty. He has a Ph.D. from Pennsylvania State University. He can be contacted by email at christopher.paparone@us.army.mil.

LOG NOTES

Moving a Supply Room

I'd like to share the creative idea of a hardworking Army logistician, Sergeant First Class Dennis Eberhard, that I believe can be of use to other Army units. Sergeant Eberhard is part of the 2–361 Combat Service Support Battalion (USAR) out of Sioux Falls, South Dakota. His unit serves under the 2d Brigade, 91st Division (Training Support), at Fort Carson, Colorado. When the 2–361 received orders to move from Fort Carson to Fort Bliss, Texas, to train a brigade in the desert for an upcoming Operation Iraqi Freedom deployment, Sergeant Eberhard was part of the movement planning team. The team not only had to transport vehicles but also move a large supply room full of equipment, supplies, and tools used to support the six observer-controller/trainer (OC/T) teams for the many units receiving training. Sergeant Eberhard had to come up with an efficient plan to move the large supply room quickly.

Sergeant Eberhard first noticed some MILVAN [military-owned demountable container] storage containers at Fort Carson that were not being used. With proper permission, and with assistance from a fellow noncommissioned officer, he acquired the MILVANs for his OC/T teams and his supply section. Next, he received permission to take large wall lockers that were being removed during a post barracks renovation before they were destroyed. He then teamed up with a General Services Administration-approved vendor of the Variable All Terrain Tiedown Systems (VATTS).

Sergeant Eberhard's idea was simple but effective. He needed large straps to secure the wall lockers onto specially made tracks that would be installed in the MILVANs. But he first needed to put his idea on paper and write a funding request to the battalion executive officer, who was skeptical at first and very frugal with battalion funds. A master sergeant with civilian experience writing grants as an English professor crafted the funding proposal. Once the proposal was approved, Sergeant Eberhard ordered and installed the equipment. With his idea turned into reality, his unit quickly moved to Fort Bliss to conduct base camp training. His mobile supply room trailers were a huge success and quickly became noticed by deploying units. His creative idea and hard work paid off.

Other units can take this simple but effective concept to make their supply rooms mobile, organized, and ready for operation the minute they hit the ground. Sergeant Eberhard is a model logistics warrior. For more information, contact me at michael.d.poss@us.army.mil.

Captain Michael D. Poss, USAR
Norwalk, Iowa

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ALOG NEWS

(continued from page 1)

modular BCTs follow historic division and brigade unit-naming conventions, their design is completely different from that of their predecessors. The essence of this transformational design is a new force that can be deployed singly or in groups and is ready for employment over a dispersed area in a variety of configurations as self-contained modules.

The announced locations of BCTs and division headquarters are—

- Fort Riley, Kansas: headquarters and three BCTs of the 1st Infantry Division.
- Fort Knox, Kentucky: one BCT of the 1st Infantry Division.
- Korea: headquarters and one BCT of the 2d Infantry Division.
- Fort Lewis, Washington: three BCTs (all Stryker) of the 2d Infantry Division.
- Fort Stewart, Georgia: headquarters and three BCTs of the 3d Infantry Division.
- Fort Benning, Georgia: one BCT of the 3d Infantry Division.

• Fort Carson, Colorado: headquarters and four BCTs of the 4th Infantry Division.

• Fort Drum, New York: headquarters and three BCTs of the 10th Mountain Division.

• Fort Polk, Louisiana: one BCT of the 10th Mountain Division.

• Schofield Barracks, Hawaii: headquarters and two BCTs (both Stryker) of the 25th Infantry Division.

• Fort Richardson, Alaska: one BCT of the 25th Infantry Division.

• Fort Wainwright, Alaska: one BCT (Stryker) of the 25th Infantry Division.

• Fort Bliss, Texas: headquarters and four BCTs of the 1st Armored Division.

• Fort Hood, Texas: headquarters and four BCTs of the 1st Cavalry Division and the 3d Armored Cavalry Regiment.

• Fort Bragg, North Carolina: headquarters and four BCTs of the 82d Airborne Division.

• Fort Campbell, Kentucky: headquarters and four BCTs of the 101st Airborne Division (Air Assault).

• Germany: 2d Armored Cavalry Regiment (Stryker).

• Italy: 173d Airborne Brigade.

The Secretary of Defense approved an increase in the number of active modular BCTs from 33 to 43 in January 2004. The National Training Center at Fort Irwin, California, also will have a BCT (-)—the 11th Armored Cavalry Regiment—to serve as the opposing force for training.

BCT positioning was a key factor in the Department of Defense (DOD) base realignment and closure (BRAC) recommendations announced in May. The BCT positioning plan, which implements DOD's Integrated Global Presence and Basing Strategy recommendations, allows the Army to return up to 50,000 soldiers from overseas locations by the end of the decade. Two key BRAC recommendations include returning the 1st Infantry Division from Germany to Fort Riley in fiscal year 2006 and relocating the 1st Armored Division from Germany to Fort Bliss at a time yet to be determined. One 2d Infantry Division brigade from Korea that is now in Iraq will be redeploying to the United States (Fort Lewis) rather than back to Korea.

Facilities to be returned to Germany in 2007 after the 1st Infantry Division relocates to Fort Riley include Harvey Barracks, Kitzingen Family Housing, Kitzingen Training Area, Larson Barracks, Schwanberg Defense Communications System Site, Faulenberg Kaserne, Wuerzburg Training Areas, Giebelstadt Army Airfield, Giebelstadt DYA [Dependent Youth Activities] Camp, Giebelstadt Tactical Defense Facility, and Breitsol Communications Station. Leighton Barracks and Wuerzburg Hospital also will be relinquished once they are no longer needed.

ARMY ISSUES NEW MATERIEL MAINTENANCE POLICY

Revised Army Regulation 750–1, Army Materiel Maintenance Policy, dated 15 July 2005, reflects a major change to the Army's four-level maintenance policy that has been in effect for the last 50 years. The revision implements policy for two levels of maintenance—field and sustainment—and updates roles and responsibilities for the maintenance of Army materiel.

Field maintenance combines operator/crew, unit, and selected direct support maintenance tasks. Performed "on system," it involves replacement of defective parts, preventive maintenance, and return of the repaired equipment to the user. Sustainment maintenance encompasses general support and depot maintenance tasks. It is performed "off system" and involves repair of defective equipment or parts and return of the item to the supply system.

The two-level maintenance concept is expected to support Army transformation initiatives by providing—

• A reduced logistics footprint in the battlespace.

• Faster return of equipment to the fight.

• Decreased need to evacuate equipment.

• Increased productivity of maintainers, which will result in increased combat power.

• Potential force structure savings.

The Army has been moving toward two-level maintenance since the mid-1990s, when Force XXI concepts began to develop. Many ground and ammunition maintenance units have already converted to the two-level system, while aviation units are not expected to begin conversion until 2008.

FCS VEHICLES TO HAVE RUBBER TRACKS

The Army's Future Combat Systems (FCS) manned ground vehicles will be equipped with hard rubber band tracks instead of metal tracks. Transportability was a significant factor leading to the decision to adopt the new band track technology.

The band tracks on this M2A2 Bradley fighting vehicle yield a smoother, quieter ride.

• Vehicles equipped with band tracks offer a smoother ride without the vibration that steel tracks produce.

• Band tracks make less noise when they move than metal tracks. Together with hybrid-electric systems, band-track-equipped vehicles will be much quieter than vehicles with metal tracks.

The new band tracks do have several drawbacks. Tests show that the lightweight band tracks are less vulnerable to small arms fire than metal tracks but more vulnerable to mine blasts. Metal tracks often can be repaired by replacing an individual link; however, band tracks must be replaced completely, which means that Soldiers must carry spare bands with them. Developers at the Army Tank-automotive and Armaments Command are attempting to develop a segmented track that has joints similar to those on metal tracks.

A vehicle equipped with band tracks will weigh about a ton less than a similar vehicle equipped with metal tracks, which will make it easier to transport by air. Other considerations that favor the band tracks include the following—

• The service life of the hard rubber tracks is expected to be double that of traditional metal tracks.

• Band tracks are less resistant to rolling, which means the vehicles can start moving faster and will use less fuel.

DEFENSE LOGISTICS CONFERENCE SLATED

"Marching Towards Seamless Support of Our Warfighter" is the theme of Defense Logistics USA 2005. This annual conference brings together logistics representatives from all four services with manufacturers of military equipment. This year's event takes place at the Renaissance Hotel in Washington, D.C., 28 November through 1 December. For more information, see www.defenselog.com.

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Coming in Future Issues—

- **Movement Control Within the Brigade Area of Operations**
- **Manila as a World War II Logistics Center**
- **Joint Modular Intermodal Distribution System**
- **Centralizing Cataloging Procedures for Non-Standard Materiel**
- **Distribution-Based Logistics**
- **The Value of Good Command Supply Discipline**
- **The Modular Movement Control Team**
- **Redefining the Role of the Forward Support Medical Company**
- **Transformation of Army Maintenance**
- **Logistics Synchronization and the Targeting Process**
- **Tactical Modularity in Medical Logistics**
- **Asset Visibility in the Tactical Environment**

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